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ABSTRACT

The purpose of this preventive search and rescue teachers guide is to help high school aged youth understand the complexities and priorities necessary to manage a human body in outdoor environments and the value of planning ahead to have on hand the skills and equipment needed for outdoor survival, comfort, and enjoyment. Separate sections present learning objectives and outline information on the topics of outdoor comfort and enjoyment, self management, heat production and temperature control, planning, equipment, cooking and eating, sleeping and shelter, emergency responses, and wilderness navigation. Other sections detail preparation, activities, and follow-up evaluation procedures for day and overnight backpack trips; recommend items, including te quantity, size, and intended uses for first aid supplies; provide sample menus for overnight and 3-day trips for three persons; and present experiments and information illustrating heat transfer and thermal conductivity. Checklists identify equipment needed, considerations, and dangers for hiking or climbing, bicycling, boating, snowshoeing or cross-country skiing, skin or scuba diving, stream fishing, and skiing. More than 140 black and white drawings illustrate important points. (NEC)

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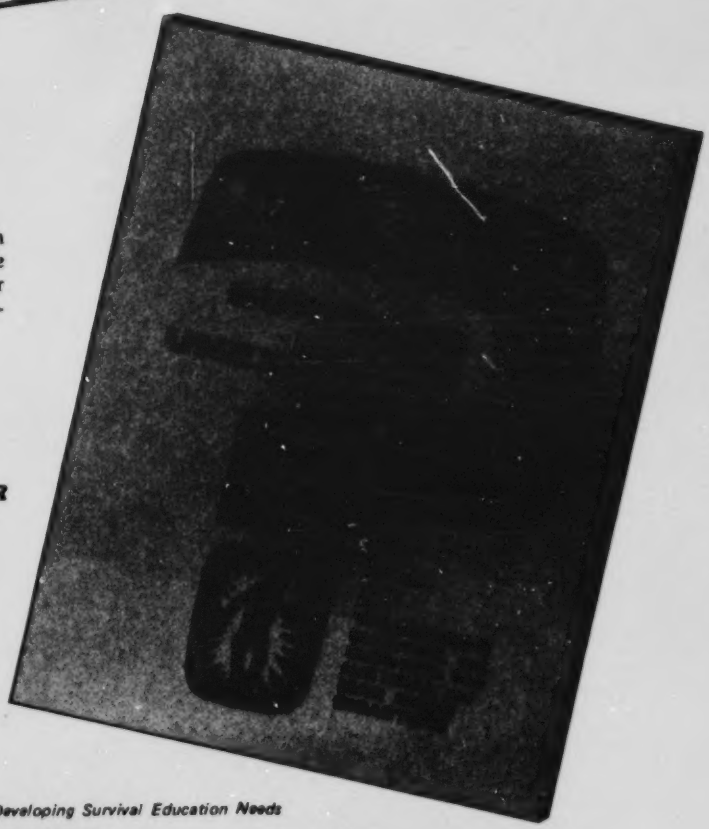

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FUNDAMENTALS OF

OUTDOOR ENJOYMENT

by

JIM MITCHELL & GENE FEAR

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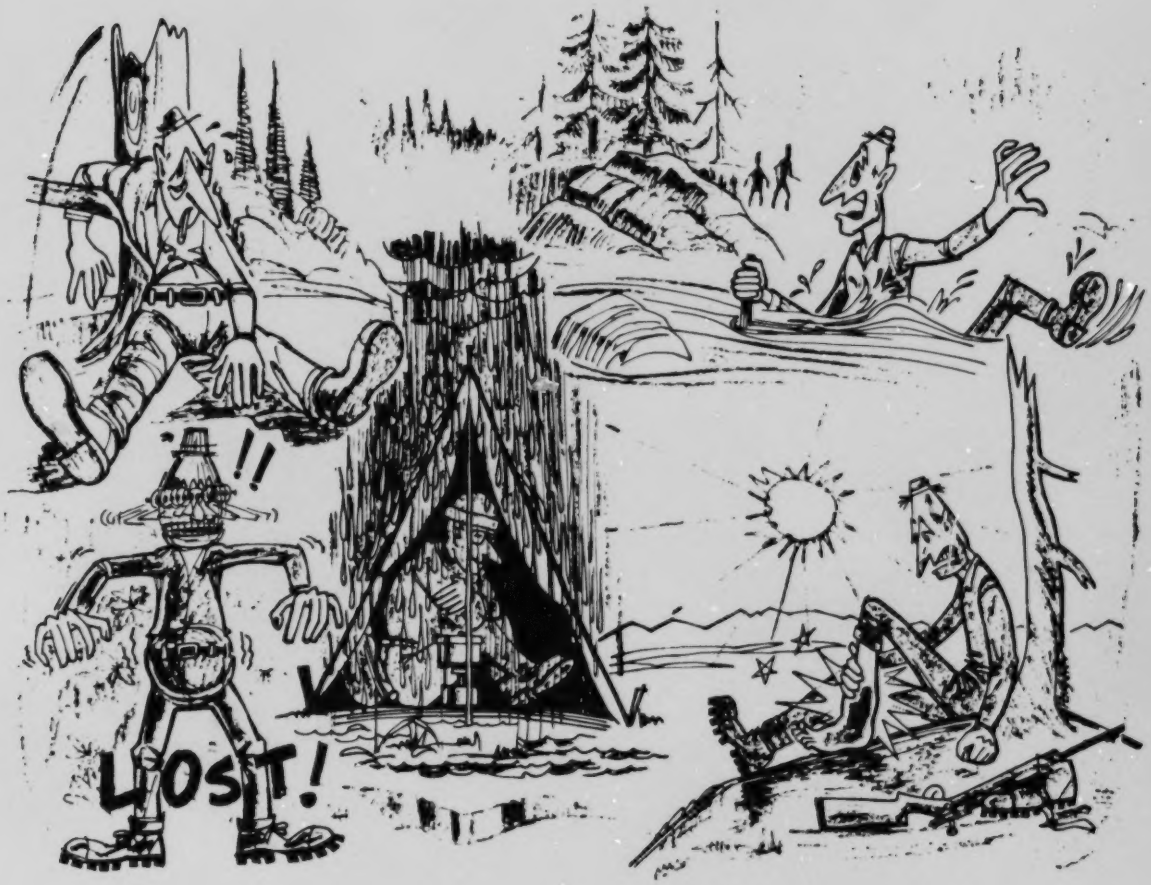
**LOOK AHEAD AND FORESEE THE ACTIVITY ON LOCATION
THIS PRODUCES A MENTAL PICTURE OF FUTURE DISCOMFORTS.**



THE AUTHORS

JIM MITCHELL

Businessman, private pilot, lecturer, author, renowned climber, Mountain Rescue volunteer and EMT. Operates a mountain guide service and mountain equipment supply store which offers many skill proficiency courses in seasonal outdoor recreation sports. Hiking, climbing, white water classes, snowshoeing, cross-country skiing and high-angle rock climbing. (Editor's note: If you want to get a glimpse of this versatile outdoorsman, see the film "By Nature's Rules." Jim played the role of Peter in the film.)

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Lecturer, farmer, truck driver, and author of numerous publications about outdoor safety and survival. Mountain Rescue volunteer, climber, educator, a successful publisher of many teaching books and visual aids for instructing survival and outdoor recreational safety in the schools and colleges.

Authored: OUTDOOR LIVING, SURVIVING THE UNEXPECTED, and WILDERNESS EMERGENCY. Developed over 500 visual transparencies for instructing the basic information needed in coping with the changeable out-of-doors.

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TABLE OF CONTENTS

Introduction 1

Foreword 2

Outdoor Comfort and Enjoyment 3

Self Management 13

Basic Concepts 21

Planning 31

Equipment 37

Cooking and Eating 49

Sleeping and Shelter 57

Emergency Response 69

Wilderness Navigation 73

Field Trips 85

Recommended First Aid Supplies 87

Clothing and Wetness Demonstrations 88

Appendix 1

Heat Transfer and Thermal Conductivity 89

Suggested Menus 91

Activity Check List 93

Personal Survival Kit 97

Recommended Books and Films 99

This **TEXT TEACHING GUIDE** was designed to help our young people understand the complexities and priorities necessary to manage a human body in outdoor environments. The interaction between the unacclimated human and the ever changing climates associated with outdoor activities has a direct influence upon enjoyment, skill proficiency or performance.

How the human body responds to physiological upset is well documented. The dangers and weather elements that abound in Mother Nature are known. This teaching guide attempts to instill these fundamentals into a program of awareness so that they become the first considerations in planning to venture away from modern services in search of adventure. Since enjoyment is the primary objective of outdoor recreation, this knowledge is the foundation of all determinations regarding comfort management during the activity. All comfort or discomfort is directly related to the planning or preparation for the activity. Since the outdoors is unpredictable and unforgiving of misjudgments in preparedness, you alone shoulder the responsibility for protecting and managing your inner and outer body.

Our objective was to develop the primary instruction and awareness necessary for any activity in the outdoors, anywhere it may occur. All humans, basically, react the same and require approximately the same energy, coolant, and defenses for given activities. What was needed was the awareness knowledge and the considerations necessary to plan and prepare to maintain reasonable comfort levels. Skill proficiency and performance declines whenever discomfort appears. Comfort must be accomplished by management of what you have inside the body, on the body, and near you. Once you are in the outdoors it is too late to acquire what you may need to maintain comfort.

The authors are aware of the specialized techniques, skills and safety procedures necessary to perform specific activities. But they feel these become a secondary objective. Skill proficiency and performance of the techniques of the activity are affected by the immediate comfort level of the individual's body. Outdoor enjoyment depends upon a reasonable, and acceptable comfort level.

As an expanded teaching guide this book covers a multitude of subjects related to body management and preparedness for adventure to travel away from modern services. The rationale explains why they are required and what happens when they are not available.

Specifically, this guide was designed as a hiking outline - teaching outline for those recreationalists that travel on foot. Or for those who carry their personal life support and comfort needs. But they ***are the same*** principles, and forethoughts necessary for any outdoor activity that might occur away from home, city, or automobile.

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DON'T FEED THE BEARS
DANGER! SLIDE AREA
WARNING! CANYON PRONE TO FLASH FLOODS!
UNSAFE FOR SWIMMING
SHARKS. SWIM AT YOUR OWN RISK!
BRIDGE WEIGHT LIMIT 10 TONS
WARNING Stay on trail
NO SMOKING
DANGER HIGH VOLTAGE

SIGNS FORECAST YOUR FUTURE

SPECIAL THOUGHTS FOR THOSE WHO ENTER THE WILD OUTDOORS IN PURSUIT OF ADVENTURE

Remember:

In the wild outdoors beyond the roadhead, Mother Nature is unforgiving of man's mistakes. Whether you enter the wild outdoors deliberately or unexpectedly, you enter a habitat vastly different from your familiar modern metropolis.

It is a place where man becomes just another animal that breathes, lives, and moves amid the natural habitat with the same self responsibility to sustain life.

In this wild place man must adhere to the laws of self-preservation.

Like the animals whose land he travels, man must be constantly alert for danger to himself and what he has with him. *Don't fool with Mother Nature.*

He must be alert for the subtle changes that precede the storm, and for human deficiencies. *Mother Nature doesn't accept excuses.*

As with all living things, man must take time to rest and refuel his limited energy and coolant reserves, or slow down his expenditures of these vital fuels through route change, pace change or comfortable rest.

Man in the outdoors must respect the weather and terrain for he can only accept them as they are. He cannot change or subdue them.

He must be aware that he is trespassing on the land where many creatures live. His deportment here reflects his ethics and respect and compassion for others.

As a trespasser far from home he must provide all of his needs and accept the consequences of his mistakes, as any other resident of this wild place.

His stature in this wild place is very small compared to the awesome bigness, stillness or fury of raw nature.

Fortunately man can acquire the knowledge and awareness to enjoy such places. He can provide his necessities. He can understand the land he travels and respect the fury of weather storms. By being mentally and physically prepared he can cope with the challenging situations that threaten his enjoyment of this place. To have this adventure man must accept the fact that he alone is responsible for his actions and will enjoy it or be miserable; live or perish according to his own judgements, actions, preparedness, planning and forethought.

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RATIONALE

This book was designed to fulfill the need for basic planning information for the millions of modern Americans who participate in strenuous outdoor sports. Most strenuous body demands have the same basic requirements: energy, coolant, temperature management in a changeable environment. Since the delicately balanced human body is the common denominator for enjoyment, survival, and participating in any strenuous activity, basic planning for one sport is very similar to all others; only the equipment and special skills needed to participate change with the activity. Any outdoor activity will place the human body amid the changeable forces of nature where self-management of limited resources, clothing and equipment will be the major criteria of enjoyment.

FOREWORD

All outdoor activities planned or unplanned are basically related. The equipment, environment, weather elements or season may change, but humans have the same mind, body, and spirit whatever the sport or activity. These vital components of the activity are what produce enjoyment, comfort and proficiency during the activity. ***This book was designed to introduce humans to the value of planning ahead - planning ahead to have what they need when they need it for survival, comfort and enjoyment.***

Knowing the techniques of a sport is proficiency. Keeping the human body functioning efficiently while away from modern services assures comfort. Comfort in the outdoors enhances the enjoyment and sport proficiency. In the familiar city, the weather elements affect the human body the same as they do in the wild storms beyond the roadhead. Weather storms are the nemesis of adventurers everywhere, because of the remoteness of resupply and security.

Each person is responsible for his or her body maintenance wherever it happens to be. The Creator gave humanoids 32,000,000,000,000 living cells to manage, 24 hours of every day they live.

The bio-electro chemical, heat-producing, movable container, which contains these cells, is delicately balanced to operate within a 10° temperature range. The chemistry that supports life processes within the container is complex and controlled by a myriad of more complex systems. It is so near perfect that most humans take it for granted, with little forethought given to planning ahead to support the inner functions or to manage the inner resources that are so quickly depleted in strenuous outdoor activities.

Planning ahead is good management of what you have with you, in you and on you.

OUTDOOR COMFORT AND ENJOYMENT

OBJECTIVES: To understand that enjoyment is self-created by every individual by what they do outdoors . . . how they do it . . . where it is done . . . and what and who they did it with.

To understand that enjoyment of an outdoor experience will depend upon many self-controlled and many uncontrolled factors.

DESIRED UNDERSTANDING:

1. WHAT TO DO OUTDOORS

A. Understand that you are reasonably secure, mentally confident and physically capable in what you attempt to do.

B. Understand that the activity has basic prerequisites that must be planned and prepared for or the activity must change. ***Example:*** find a ball, bat, place and other players for a ball game. To ski you need: snow, skis, clothing, energy and a place.

2. HOW TO DO IT:

A. Understand that planning and preparation are the foundations of all outdoor comfort and safety.

B. Understand that the location of the activity must be within legal, mental, physical, and equipment range of the participant.

C. Be aware that weather will be the dominant factor affecting your comfort, enjoyment, vehicles and personal performance during the activity. Heat and cold are known enemies.

4. WHAT TO DO IT WITH OUTDOORS:

A. Understand that you must have certain basic equipment.

B. That equipment may require pre-use practice and a skill proficiency.

C. Understand that mechanical vehicles can cause delays, frustrations and leave you stranded miles from assistance.

D. That the human body must be supplied with necessary fuels and protected from weather extremes.

5. WHO YOU PARTICIPATE WITH CAN AFFECT ENJOYMENT:

A. That other people in the activity can influence your enjoyment with anguish, fears, doubts, and delays.

B. That others can create situations beyond your control that may jeopardize your comfort, or life.

WHAT TO DO OUTDOORS

ITS NECESSITIES ARE FEW - BUT ARE MANDATORY IN SUSTAINING LIFE.

Discomfort is what every outdoorsman wants to avoid. He spends a lot of his valuable time and money to plan an activity so he can enjoy it. His plans for the short adventure were elaborate. It covered everything he might need . . . except knowledge of body management. His discomfort began when the fast pace and steep hillside created pains in his legs. The strenuous muscle use caused overheating, fast breathing and a pounding heart. The sweat-wet clothes made his rest stops miserable. His legs hurt. His chest hurt. His stomach hurt. In fact, he hurt all over so much that his self-inflicted misery caused him to give up the adventure and return to the comfort of home.

These self-inflicted miseries would have continued to plague our friend until he slowed down physical exertion through management of his body. He could have learned. He could have been aware of the body's problem indicators and how to manage his inner and outer body. His discomfort and misery didn't have to happen. Knowledge of body management during outdoor travel is a very necessary part of planning.

Remember . . . every human has so much inner body energy to travel so far at any speed, or to shiver so long a period of time. This vital fuel can be managed and conserved to last a long time. Or it can be used up quickly through mismanagement. ***The choice is yours alone.***

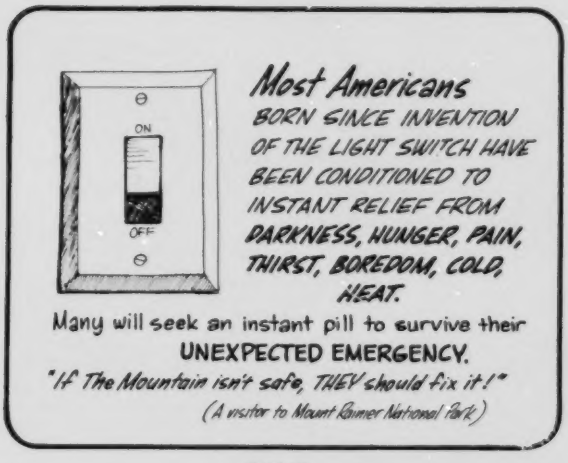
THE CHOICES

It makes no difference what outdoor sport or activity you pursue,
if it takes you away from modern services and your accustomed controlled environments; you must carry an artificial environment with you long enough to become acclimitized. (If not, you will be uncomfortable and miserable.)

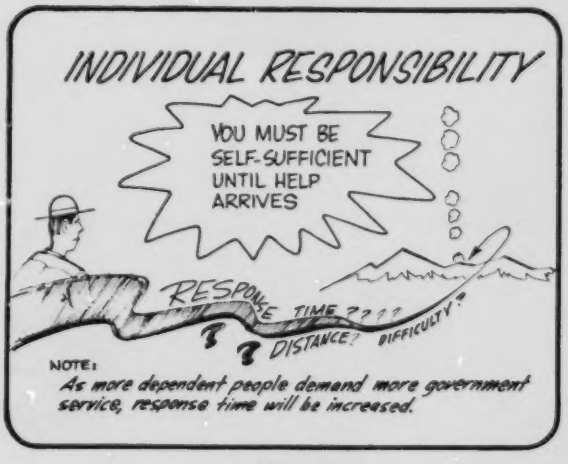
If the activity takes you away from modern roads and accustomed navigational aids:
you must have the knowledge and the tools necessary to navigate your body back to its starting point. (If not,plan to travel slow enough to become familiar with the area as you travel through it.)

If the activity takes you away from your kitchen, closet and thermostat:
you must plan to carry enough food, water and clothing to refuel your body and protect it from whatever weather you may encounter during the complete trip.

If the activity takes you away from accustomed governmental emergency response agencies such as firemen, police, doctors, ambulances:
you must have the knowledge to cope with the dangers long enough to get out of the predicament and reach aid.


ON
OFF
Most Americans
BORN SINCE INVENTION OF THE LIGHT SWITCH HAVE BEEN CONDITIONED TO INSTANT RELIEF FROM DARKNESS, HUNGER, PAIN, THIRST, BOREDOM, COLD, HEAT.
Many will seek an instant pill to survive their UNEXPECTED EMERGENCY.
"If The Mountain isn't safe, THEY should fix it!"
(A visitor to Mount Rainer National Park)

OE 1


INDIVIDUAL RESPONSIBILITY
YOU MUST BE SELF-SUFFICIENT UNTIL HELP ARRIVES
RESPONSE TIME ????
? ? DISTANCE? DIFFICULTY?
NOTE:
As more dependent people demand more government service, response time will be increased.

OE 2

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If the activity requires special safety equipment for life support,
carry them and know how to use them quickly and effectively. (Ice axe, life vest, flashlight, matches, compass, maps, stoves.)

Guard against accidental loss of these life support tools: stove exploding, life vest floating away, dropping ice axe, canteen spilling on the desert, your only tin pot blowing away.

If the activity is strenuous to large muscles:
you will need to resupply food energy and coolant reserves frequently and practice conservation techniques. You should start the activity with a surplus of these vital supplies, not a deficit.

If the activity requires you to trust your life to someone else for safety and protection, such as in belaying and rope handling:
make sure that person knows how to properly execute the procedures and has the proper equipment and sound techniques of using them. Trust no one until they have proven they can effectively perform the act that will be your protection. (Belaying a climber on a cliff or crevasse crossing.)

If the activity has other participants:
be sure that what someone else does doesn't jeopardize your life. Whenever you doubt the validity of someone's decision that affects your life, speak out. Leaders can make mistakes too.

Even in a group you have to manage your own body. Only you feel the fatigue, cramps, thirst, hunger, and pain that often are the result of strenuous activities in the outdoors.

FORETHOUGHT IS ESSENTIAL

The one ingredient that cannot be overlooked in planning to participate in any outdoor activity is the human body, which has inherent limitations. That body must have the energy, air, and liquids necessary to function. It must be maintained within very narrow temperature limits, and it must be guided and controlled by acquired knowledge.

Since refueling and protecting the human body take the highest priority, clothing and protective equipment rate high on the list of preparedness items. Foot travel means you must have foot protection for the type of terrain you plan to travel on. Sore feet can spoil enjoyment. Weather changes dictate a variety of outer protective clothing which can be regulated by you for insulation against cold or for ventilation to provide cooling of the overheated inner body.

The variety of environments available for outdoor activities is limitless. Weather changes alone create a need for effective body protection. But the activity can also produce heat gain and chill factors that must be compensated for before misery steals your enjoyment. Body management and your awareness of debilitating effects of the stress of outdoor activities are the only way you can avoid outdoor miseries.

Some equipment is necessary to participate in specific outdoor activities. But the use and care of this equipment is the user's responsibility. This again brings the burden onto the shoulders of the participant for proficiency of use within the changing environment of the activity. It seems every little thing has a key role in the end result of any outdoor activity. Judgement alone often makes the decision to turn back to less challenging activities.

The asset you start any activity with is a warm, bio/electro/chemical/heat-producing machine that runs under tight, exacting controls in a very narrow optimum temperature range. YOU must manage this body wherever it goes.

II. CONTROLLABLE FACTORS IN OUTDOOR ACTIVITIES:

1. WHAT TO DO:

A. You can do anything . . .
- within the legal boundaries (trespassing).
- you are physically capable of doing (walking on water).
- you are mentally comfortable with (non-frightening).
- within vehicle travel limitations (to South Pole).
- within range of equipment use (skis need snow or grass).
- within range of skill proficiency (shooting - proficiency enhances enjoyment).
- within time limitations (amount of daylight).
- within range of guidelines of safe participation (white water).
- where weather allows participation (ball game in a blizzard).
- that provides a relaxing change from everyday activities.

B. Enjoyment is greatest when a person does something that makes that person feel good because of a sense of mental and physical accomplishment.

C. Before attempting anything, LOOK AHEAD to what you will need to participate; what you have to participate with; and the effect upon your body and its resources.

2. HOW TO DO IT:

A. Avoid, when possible, physical and mental stress.

B. Practice before participating improves proper reflex action to changing situations in equipment use (shooting bears, skiing glaciers, cycling).

C. Choose locations to complement proficiency (slight slope vs. steep slope).

D. Avoid hazardous terrain (golfing near picture windows, skating on thin ice).

E. Avoid unreasonable challenges to unconditioned muscles (10 mile run, swimming race across the lake, high altitude climb).

F. Be prepared for the type of weather expected for the season and the unexpected changes that may occur (carry whatever is necessary to maintain body comfort and safe participation in the activity).

G. Choose companions with care. Try to have similar skill proficiencies as well as mental and physical capabilities (weak vs. strong).

H. Remember that strenuous exercise will require more energy and coolant, and will create more stress on the mind and body (running vs. walking, uphill vs. downhill).

3. WHERE IT IS DONE:

Enjoyment is something that is mentally and physically rewarding - a memory of pleasant places, people, and the activity that brought them together. Misery is remembered because of the agonizing mental and physical stress of a situation that caught you unprepared to maintain accustomed comfort levels.

A. The outdoor activity must be within travel limitations. (Surfing may be 2000 miles away, snow may be two days away.)

B. It must be within your usable free time limitations. (Hiking 10 miles in two hours of daylight. Traveling five hours to snow, ski one hour, then five hours to return. Planning two weeks of activities for one week of free time.)

C. Must be permissible legally without the threat of arrest, fines, or confinement. (Trespassing without permits influences enjoyment.)

D. Know in advance the requirements for participation in the activity (insurance, permits, laws, and equipment needs). These can stop many activities.

E. Choose an activity compatible with the area of participation (hiking in hip-deep snow; boating in the desert).

F. Weather must be within acceptable range for participation in the activity. (Some days the animals hole up. Visibility affects navigation. Chill factor on a warm body; heat effect on exposed flesh.)

G. Activity must be within range of physical limitations and resupply of vital body fuels for body maintenance. (10 days' hike with 2 days' food; a solo hike to the North Pole.)

H. Activities and equipment must be within the range of reliability and feasibility. (Canoeing to Hawaii; snow climbing in street shoes; bear hunting with BB's.)

4. WHAT TO DO IT WITH:

Modern America's outdoor activities vary with the seasons, free time available, economic status, acceptable weather, and availability of equipment and locations for participation.

A. Equipment.

(1) Equipment must be adequate for the activity, weather, and terrain. ($25 skis slide on snow just as well as $300 ones unless you are in competition where seconds count.)

(2) Equipment must be mechanically safe and used properly. (A cracked ski that breaks 10 miles from the car becomes a liability that upsets enjoyment. Snowmobiles in soft snow.)

B. Weather must be acceptable and reasonably safe for participation.

C. Human body limitations must be considered in any activity.

(1) You need to start the activity with a surplus of energy, water, and necessary chemicals within the inner body. A deficiency of any vital supply will affect performance and enjoyment.

D. Limited resources vital for body functions must be considered and resupply allowed for.

(1) The energy needed for strenuous outdoor activities must be managed with tempered judgment. Always have enough for a return trip and some to spare for response to emergency situations.

(2) Your energy requirements will vary with the activity, terrain, weather, and speed of travel. Most activities need little more than a normal intake of food and liquids. However, these may become critical factors whenever the activity becomes strenuous or lengthy.

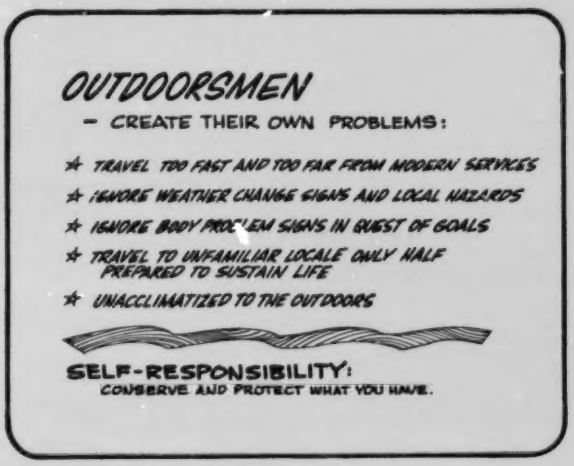
(3) Food and equipment that provide comfort, influence enjoyment. No matter what outdoor activity you pursue, you must be self-sufficient away from modern technological amenities. (Warmth, food, water, security, other clothing, other equipment, and easy access to doctors and repairmen may not be obtainable.) You must leave home with all the needed items that will not be available in the outdoors, or have the minimum supplies plus the knowledge to improvise the rest.

For example:

a. Boating: Windchill; dampness; possibility of no bathrooms, food, or water, first aid supplies or flotation. (In boating you take a little bit of those things you may need, and are mentally prepared to improvise the rest.)

b. Skiing: Equipment to slide on snow, warm clothing, food and water depending upon the time of year, place, and conditions. (The farther you go from modern supplies, the more dependent you become on knowledge to improvise them. If you are 200 miles from civilization on foot, your feet and legs become your most valuable resource; every step must be correct.)

E. Forethought should be given to those vital necessities that may not be available at the location of activity (bathrooms, foodstores, fuel, equipment, clothing, water, etc.).


OUTDOORSMEN
- CREATE THEIR OWN PROBLEMS:
☆ TRAVEL TOO FAST AND TOO FAR FROM MODERN SERVICES
☆ IGNORE WEATHER CHANGE SIGNS AND LOCAL HAZARDS
☆ IGNORE BODY PROBLEM SIGNS IN QUEST OF GOALS
☆ TRAVEL TO UNFAMILIAR LOCALE ONLY HALF PREPARED TO SUSTAIN LIFE
☆ UNACCLIMATIZED TO THE OUTDOORS
SELF-RESPONSIBILITY:
CONSERVE AND PROTECT WHAT YOU HAVE.

OE 3

OE 4

5. WHO YOU PARTICIPATE WITH AFFECTS ENJOYMENT:

A. Choose your companions very carefully. What they do or don't do influences your enjoyment and your safe journey.

B. Your companions' attitudes, skills, proficiency, and physical conditioning can have a direct effect on your activity.

C. Their physical performance influences time, distance, and proficiency (you may have to carry the extra burden they cannot carry).

D. Their attitude is reflected in their skill, judgment, and performance.

E. Their self-image often influences others in the party. Their negative or positive attitude affects the outcome of the activity. (Determination to go on in the face of adversity; doubt creates a failure syndrome; fear of the unknown causes anxieties that overrule confidence.)

F. Unequal attitudes influence enjoyment more than anything. An activity that is forced upon someone who does not want to participate causes mental anguish and irritability. ("I wish I was doing something else. I hate this. Why must you do it?")

G. Unequal participants, either in skills, experience, or physical ability.

(1) Fast hikers vs. slow hikers cause delays to one group and inadequate rest to the slow group. Both suffer frustration.

(2) Inexperienced vs. experienced - can be good if it is known before the start and time is allowed for training enroute.

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(3) Unequals pitted against an activity - creates a burden on both persons. One does more work than the other in carrying the weight. In tennis, one overplays the other or causes delays. In climbing, inexperience causes delays, unsafe belays, and unnecessary route changes for protection and safety.

H. The activity must be within the mental and physical limits of those involved. (A cliff climb may be frightening to someone fearful of heights. Carrying heavy packs too far, too fast, causes misery. Too much weight quickly causes sore legs and shoulders, and fatigue.)

I. Inexperienced persons in a mixed outdoor activity with experienced people may cause mental anguish, delays, and a loss of confidence. (The inexperienced know they are the burden that causes these problems.)

J. Research the outdoor activity before attempting it.

(1) Many outdoor activities use similar equipment and techniques.

(2) Many skills have cross applications in the outdoors.

(3) Know, practice, and prepare for the skills that help maintain mental and physical proficiency and those that provide comfort.

K. Avoid the stress that can take away enjoyment.

Saying NO! to an activity may be hard to do. But anything that may upset your confidence and mental comfort will create misery during the activity. (Avoid an activity in which you expect unpleasant results. Perhaps memories of past miseries and failures seem to haunt the present attempts. You can change your attitude and the probable outcome by improved training and preparation, thus building an expectation of success and fulfillment in the activity.)

UNCONTROLLABLE FACTORS THAT INFLUENCE COMFORT AND ENJOYMENT

III. THE ENVIRONMENT

A. WEATHER:

1. The weather influences your outdoor activity in many ways. It may be good or bad. Whatever, wherever, or however, each outdoorsman must attempt to compensate for its effect any way possible, with what he has.
2. The law of preparedness is to look ahead to the future to see what you may be without during probable situations.
3. Since weather is unpredictable, it possesses the most disruptive influence to your outdoor comfort and enjoyment.
   - A summer storm sweeps the beach clean of bathers.
   - Snow storms hide the trail and high landmarks.
   - Wind affects a canoer's destination.
   - Wind and heat dehydrate the cyclist.
   - Wind on exposed ridges cools the hiker.
   - Drifting snow stalls the driver.
   - A picture is lost because the camera iced up.
   - Wet clothing causes a hasty retreat to comfort.
4. Weather uphill from your activity area can affect the rivers and lowlands. (Rain in the hills can cause rivers to rise quickly, making a small creek into a raging torrent.)
5. Some weather storms create emergencies where all travel must be stopped and every effort devoted to maintaining body warmth. Heavy snowfall often calls for a quick retreat to prevent leaving your vehicle at the road end until spring.

6. What you can do about these weather problems:

   Plan ahead. Respect the weather. Always expect the best, but prepare for the worst. Plan for delays and escape routes. Look ahead to what you may need to maintain comfort. Be alert for weather changes that warrant immediate protective actions.

2. OTHER PARTICIPANTS:

A. Others in the party may influence your enjoyment with thoughtless provocations.

B. Consider these and how they might affect your outdoor experience:

- The incessant talker of irrelevant nonsense - or the silent one.
- The radio freak with loud jive music in the peaceful meadow.
- The clumsy, noisy hiker near where you are stalking animals.
- The heel pacer who walks so close he steps on you.
- The person who uses unacceptable language.
- The person who cheats on load carry weight distribution.
- The noisy fisherman near your favorite deep hole.
- The careless, unsafe person on your glacier rope team.

C. No one has said that the outdoors is a safe place. Our world is unsafe. The outdoors is is a safer place than our cities, once you have taken the time to learn how to manage your body amid changing environments.

3. UNCONTROLLABLE EMERGENCIES:

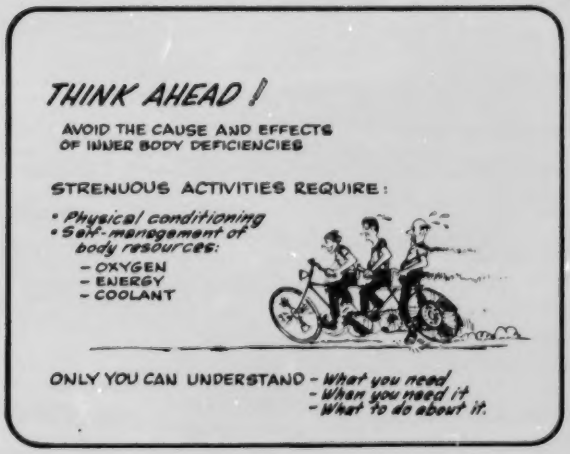
A. Emergencies can disrupt any outdoor activity by suddenly forcing the change from enjoyable play to tasks of emergency response.

(1) Equipment failure:

a. Dependence upon vehicles, with their potential unreliability, leaves many travelers stranded far from assistance.

b. Misuse of hardware is a major factor in equipment failure.

c. When a piece of equipment is your lifeline, inspect it often and guard against misuse.


THINK AHEAD !
AVOID THE CAUSE AND EFFECTS OF INNER BODY DEFICIENCIES
STRENUOUS ACTIVITIES REQUIRE:
• Physical conditioning
• Self-management of body resources:
- OXYGEN
- ENERGY
- COOLANT
ONLY YOU CAN UNDERSTAND - What you need
- When you need it
- What to do about it.

OE-5

OE-6

(2) Human error:

a. Fatigue and carelessness are the major causes of a person not using good judgment and the skill techniques necessary.

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b. The subtle effects of heat and cold upon the inner body cause loss of dexterity, muscle coordination and mental judgment.

c. The mental stress of fast changing situations may cause temporary loss of **control in the inexperienced.**

(3) Weather-caused emergencies:

This is a dominant factor in most emergencies. Weather creates many of the situations that pose a real threat to life during outdoor adventures because it catches the outdoorsman unprepared to protect his body from the storm's effect.

b. Weather causes navigational problems by hiding the landmarks. Rain causes slick trails, swift rivers, wet clothing, and soggy food.

c. Strong winds, blowing snow, deep snow, blistering heat - all affect the human body, the activity, and the comfort of those participating in the adventure.

d. The weather influence upon equipment, alone, could be hundreds of lines of type. The weather's effect upon your body could be a large book. The weather's effect upon all of your outdoor activities and the resulting consequences could be an encyclopedia.

4. WHAT YOU CAN DO ABOUT THESE UNCONTROLLABLE EMERGENCIES:

A. Plan for the best, but prepare for the worst.

B. Always have an escape route from dangerous places.

C. Think about where you are going in respect to availability of doctors, repairmen, hospitals, and modern technology and services.

D. Look ahead to see what could happen in your activity area at that season of the year (avalanches, dry creeks, no fuel).

E. Be aware of the party strength, experience, conditioning, and the equipment limitations.

F. Be aware of the emergency response procedures that would help you gain outside assistance quickly.

G. Knowledge of first aid helps in patching up injuries for self evacuation.

H. Carry what you need for self preservation (ice axe on steep snow; life preserver on water; water in the desert, etc.)

I. Carry in your pockets those items needed to patch, protect, and navigate your own body back to civilization.

Outdoor emergencies in remote areas can threaten your life in many ways. Mostly they force you to make-do with what you have in you, on you, and around you - without any help from others.

More and more outdoorsmen are creating a burden upon society for rescue from self-created emergencies. In the future this expensive operation may be assessed the victim by the responsible land management agency. It is already in effect in some areas and foreign countries. It has become apparent that over 80% of the outdoor emergencies could have been prevented. All the person or persons involved needed was to have been aware, prepared, educated, and experienced in self-management for that particular activity and areas of participation. Self evacuation and self rescue along with self awareness and preparedness for all outdoor activities will become more attractive once the burden of rescue begins to be an economic factor to the outdoor sport.

INTRODUCTION

FUNDAMENTALS OF OUTDOOR ENJOYMENT

When we analyze the basics of all strenuous outdoor sports, it becomes apparent they are all related. One mind, one body, one spirit - in a variety of environments. Any sport uses a variety of learned physical skills and various special equipment to participate in the activity. But the enjoyment of the sport pivots on the mental and physical comfort of the body while participating. A change in mental attitude or physical comfort will affect the performance and enjoyment.

If a person wishes to enjoy an outdoor activity, he should first learn how his body will be affected by the sport: How much energy? How much coolant? The physical strength and acclimitization needs. How weather can affect the sport and the participant's body. What environmental dangers could affect the sport? What mental aspects could affect comfort or threaten life? What material things are necessary to protect and provide for life - and comfort?

Most Americans have been out of doors around home, so why should the outdoor adventurer learn more about what is apparently normal living? Statistics have shown that most outdoor problems develop because the victim's body has somehow lost the ability to function efficiently or effectively - to think, act, or analyze a changing situation. This inner body problem occurs in all sports. Most often the subtle results of minor hypothermia, hypoxia, hyperthermia, hypohydration or fatigue are the cause. Whatever the cause they affect muscle coordination, judgement and attitude. Attitude alone can often set the stage for an accident. These basic responses to mismanagement of the human body contribute to your discomfort and ability to participate safely and effectively.

The autonomic nerve system controls the major inner body functions while the mind determines where the physical body will go - with whom, with what, and when to go. In the course of daily life, humans dress themselves, feed themselves, slake their thirst, and rest their bodies. Managing the mass of complex living cells that make up the human body is the responsibility of each individual, wherever he may be.

Humans can batter, bruise, and break the body's framing structure without dire consequences to life. Yet a few degrees deviation above or below the normal inner core temperature causes the vital system upset that will affect the mind, and the body's ability to function effectively. Therefore body protection from heat gain or heat loss becomes about the most valuable asset a person manages every day everywhere.

Food and water input must offset output or the inner body will suffer a deficit. The very limited energy bank can be walked away, blown away, or conserved to last a long time.

The limited body coolant is easily depleted by muscle use or overheating, causing hypohydration. This creates many self-compounding problems to the inner body through thicker blood, chemical loss, nervous system upset, and loss of body cooling efficiency.

Managing your inner body and its outer protection is the key to comfort and enjoyment while pursuing any outdoor activity. Jim Mitchell's new book on planning and preparing for body management anywhere should become the basic teaching for any strenuous sport outdoors.

SELF MANAGEMENT

Objective: To understand that outdoor miseries and discomforts are self-inflicted and overcome only by self-management of what you have in your body, on you and around your body.

DESIRED UNDERSTANDING:

1. Looking ahead to see what you will not have available.
2. Self-management is a personal responsibility.
3. Controlling self-inflicted miseries.
4. Extending the body's limited resources.
5. Outdoor ethics is your responsibility.
6. Response to emergencies.
7. Extending enjoyment.

Discomfort is what every outdoorsman wants to avoid. He spends money and time to plan the activity so he can enjoy it. Too often his fast pace and route selection created pain in his legs. Strenuous muscle use caused his body overheating, fast breathing and a pounding heart. These self-inflicted miseries will continue until he slows down the physical exertion through self-management of his body.

Every human has so much inner-body energy to travel so far at any speed or to shiver or sweat for so long a period of time. These vital body fuels can be conserved to last a long time or they can be used up very quickly by the outdoorsman's mismanagement.

I. Looking ahead can eliminate nagging discomforts.

A. Considerations should be given to taken-for-granted comforts.

Shaving?	Bathing?
Clean face?	Toilet Paper?
Brushing your teeth?	Contact lens?

Or any other habit that makes you feel more comfortable.

B. Everyone has different HABITS - VALUES - ATTITUDES. Some can tolerate pain, others cannot.

Insects?	Height exposure?
Cold?	Hungers?
Heat?	Thirst?
Fatigue?	Wetness?

C. Consider personal distastes, dislikes, and discomforts, then try to be better prepared to counteract their nagging miseries.

Your pockets, packs, and purses should carry those items that make you feel more clean, happy and comfortable.

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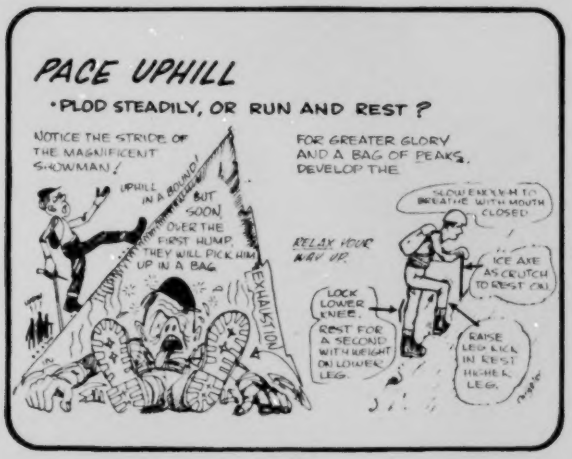
II. SELF MANAGEMENT is a personal responsibility.

A. **Since you manage** your body 24 hours each day, considerations should be given to dressing it, feeding it, slaking its thirst, and deciding what you will do during the activity.

B. **Pace:** A continuous muscle movement of any kind. Length of step or movement must be regulated between heart, lungs, muscles and the activities need. Valuable for conserving limited reserves of energy and coolant to prolong the activity. Applies to rowing, paddling, walking, climbing, or any continuous muscle movement.


PACE UPHILL
•PLOD STEADILY, OR RUN AND REST ?
NOTICE THE STRIDE OF THE MAGNIFICENT SHOWMAN!
UPHILL IN A ROUND!
BUT SOON OVER THE FIRST HUMP, THEY WILL PICK HIM UP IN A BAG.
EXHAUSTION
FOR GREATER GLORY AND A BAG OF PEAKS, DEVELOP THE
SLOW EXERCISE TO BREATHE WITH MOUTH CLOSED
RELAX YOUR WAY UP.
ICE AXE AS CRUTCH TO REST ON
LOCK LOWER KNEE.
REST FOR A SECOND WITH WEIGHT ON LOWER LEG.
RAISE LEG & KICK IN REST HIGHER LEG.

OE-7

PACE DOWNHILL
•"HASTE MAKES WASTE." "MOST ACCIDENTS OCCUR ON DECENT."
American Alpine Club
MAJOR CAUSES OF ACCIDENTS
1. JOY OF ACCOMPLISHMENT MAY LESSEN RATIONALE FOR SAFETY
2. CARELESS HASTE
3. OVERTAKEN BY DARKNESS
4. FATIGUE* (Recognized or not)
*NOTE A BACK COUNTRY TRIP IS NOT HALF OVER UNTIL YOU'VE WALKED THREE QUARTERS OF THE DISTANCE.
USE PLUNGE STEP FOR STEEP SNOW
DRIVE STRAIGHT DOWN
HEEL IN SHARPLY

OE-8

C. **Rest step:** A means of resting one leg muscle while hiking or climbing. This rhythm can be applied to any activity and most muscles.

D. **Downhill plunge step:** Heel of boot always first. Can be dangerous in deep soft snow.

E. **Resting:** A means of refreshening the inner body. Fatigue appears when the bloodstream and muscles become saturated with waste products. Slow down muscle use immediately. Resting for 7 to 10 minutes can rid the body of approximately 30% of the detrimental waste products. Lie down. Rest in a comfortable environment is the ideal way for the inner body to rejuvenate itself by refueling the muscles and vital organs.

F. **Energy use during strenuous activity:**
Frequently nibbling small amounts of high energy foods allows the stomach to convert food to energy and replace that being used, without upsetting the inner body.

Like your automobile, your body has certain limitations and performance requirements. You cannot take it for granted that they will perform as expected without maintenance, refueling, and protection from the elements.

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G. **Weather:** A natural, changeable, unpredictable resource that prevails in the out-of-doors.

1. The one factor of outdoor adventuring that can affect enjoyment.
2. A factor that can create a threat to life during storms.
3. A fact that must be anticipated and prepared for with protection.
4. Vicious weather storms often necessitate protection of personal equipment - inner and outer body supplies.
5. Consider aborting the trip and seek an alternate activity.
6. Consider weather and its effect on the activity. Forethought during planning allows the preparedness for comfort or the means to implement a defense against the miseries.

SEVERE STORM EMERGENCIES

In a blizzard or sleet storm, if you are without shelter and exposed to the full fury of the storm, shelter is the Number 1 priority. Put on all of your clothing. Then walk, slowly and cautiously, with your back to the wind, to a less hostile place. Make fire and shelter as soon as possible.

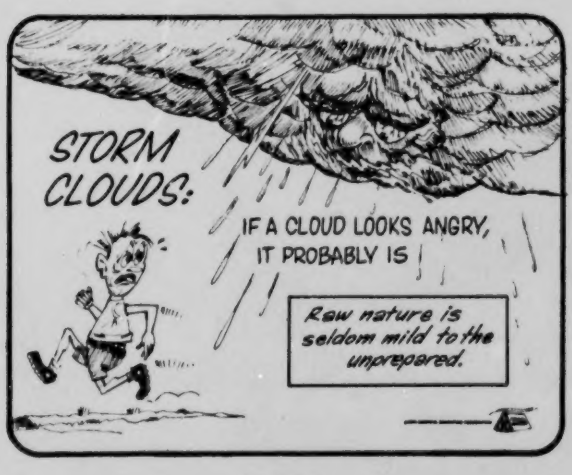
III. Controlling self-inflicted miseries and discomfort.

A. ***Lessening discomfort during strenuous muscle activity.***

1. Body management - make a conscious effort to maintain an effortless pace.
2. Breathing - get a rhythm to your breathing, pace and body swing.
3. Energy - nibble high energy foods.
   Coolant - drink more than you think you need.
4. Weather - analyze its effect on your body - put on or take off insulation.
5. Rest - rest out of hot sun or cool breeze.

B. Rest in a beautiful spot - out of hot sun or cold wind.

1. A change of thought can overcome the mental lethargy of strenuous, monotnous physical effort.
2. Positive talk will bring out the can-do attitude and reinforce the enjoyment. On very long or non-technical trips, give your mind an interesting problem to solve. Sometimes you can mentally picture yourself somewhere else. Talk to yourself. Self-talk is a powerful stimulus for gaining difficult goals. Without it many of the world's highest mountains would not have been conquered..



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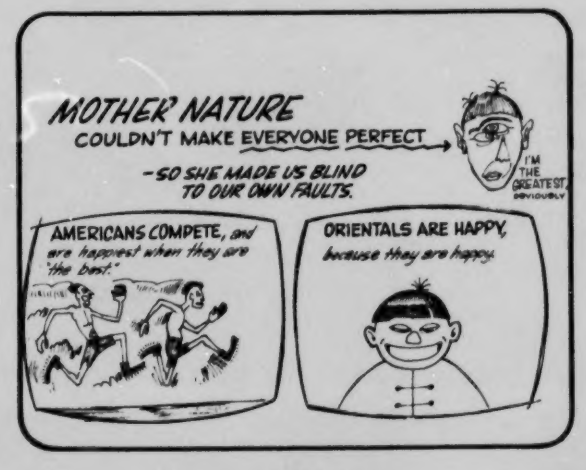
MOTHER NATURE COULDN'T MAKE EVERYONE PERFECT
-SO SHE MADE US BLIND TO OUR OWN FAULTS.
I'M THE GREATEST, OBVIOUSLY
AMERICANS COMPETE, and are happiest when they are "the best."
ORIENTALS ARE HAPPY, because they are happy.

OE-10

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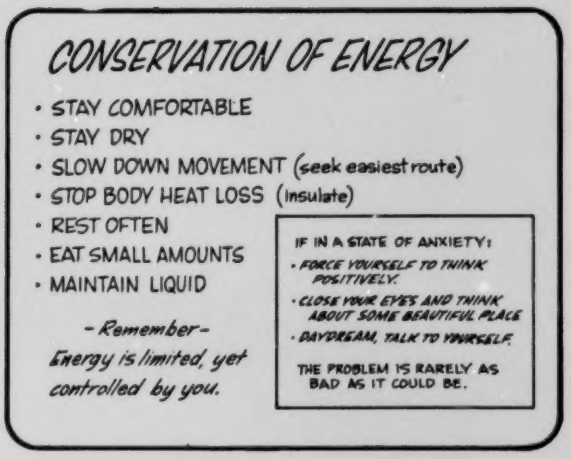
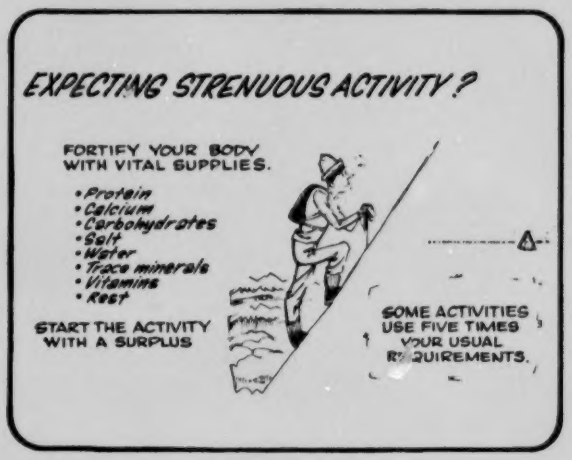
Outdoor safety is a personal responsibility. In the wild outdoors beyond the roadhead it is impossible to be truly safe, but you can minimize the danger through an awareness of what dangers exist in the area of the activity.

This awareness allows you to plan ahead to have those few items necessary for maintaining life and comfort. Awareness plus alertness helps you to avoid danger areas.

3. Always be alert for any attitude changes within the group. Discomfort rapidly changes personal attitudes, efficiency, and ability.
4. ***Speak out if you are uncomfortable!*** Only you can understand your body's needs.
   - PACE TOO FAST? Tell them so. UPHILL? Use the rest step. DOWNHILL? Tighten boot laces or lessen the descent rate.
   - ENERGY LOW? Eat sugary food (small amounts frequently). Drink water - with salt if you have been prespiring a lot.
   - THIRSTY? Drink water with small amounts of salt added.
   - FATIGUED? Lessen the steepness by route change. Use the rest step.
   - WIND CHILL? Put on insulation before you shiver.
   - OVERHEATING? Ventilate at first signs. Change your route out of the sun.
   - NATURE CALL? Ask the leader for a party separation NOW!
   - REST NEEDED? Ask for it and then take a flat out siesta for 10 to 15 minutes.


CONSERVATION OF ENERGY
• STAY COMFORTABLE
• STAY DRY
• SLOW DOWN MOVEMENT (seek easiest route)
• STOP BODY HEAT LOSS (insulate)
• REST OFTEN
• EAT SMALL AMOUNTS
• MAINTAIN LIQUID
-Remember-
Energy is limited, yet controlled by you.
IF IN A STATE OF ANXIETY:
• FORCE YOURSELF TO THINK POSITIVELY.
• CLOSE YOUR EYES AND THINK ABOUT SOME BEAUTIFUL PLACE.
• DAYDREAM, TALK TO YOURSELF.
THE PROBLEM IS RARELY AS BAD AS IT COULD BE.

OE-11



OE-12

IV. Extending The Body's Limited Resources.

A. EXTENDING BODY ENERGY

1. Slowing down muscle use with pace and rhythm.
2. Staying warm and stopping body heat loss.
3. Traveling on less steep terrain.

Energy for heat production and muscle use are the same. When you are too fatigued to walk you may be too fatigued to shiver for warmth. ***Set goals. Think positive thoughts. Eat small amounts of sugary foods frequently.***

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B. EXTENDING YOUR BODY COOLANT.

1. Slow down heat gain any way possible.
2. Slow down muscle movement to absolute minimum.
3. Travel in shade or wait for cooler weather.
4. Ventilate clothing. Wet clothing with water to increase evaporation. (Undrinkable water can be used.)

Drink when thirsty. Do not ration water. Drink it when thirsty. Body liquids are necessary for the inner body vital organs and for perspiration cooling. Often it will be the most limiting factor on a hot weather adventure.

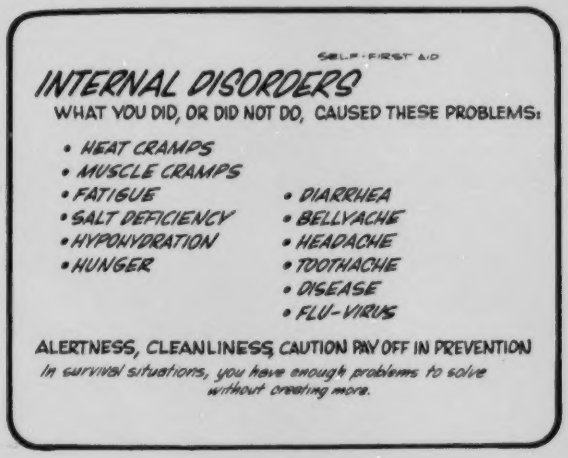
C. OVERCOMING FATIGUE.

1. Slow down length of pace.
2. Use a rest step.
3. Talk to yourself.
4. Breath deeper with a rhythm.
5. Increase the blood flow to the distressed area.
6. Use a lie-down, flat-out rest for 15 minutes in a comfortable enviroment.
7. Get more comfortable.
8. Loosen your boots.
9. Rest oftener.

Muscle fatigue is built up of CO_2 and lactic acid in the muscles. Muscle fatigue is a build-up of used energy waste products in the muscles and inner body vital organs. The only known way to cleanse the blood stream is to allow time for the circulatory system to replace the waste products with fresh fuel.

WHAT GOES IN-
MUST COME OUT.
YOUR DIGESTIVE SYSTEM PRODUCES WASTE PRODUCTS THAT MUST BE ELIMINATED REGARDLESS OF LOCATION.
IN NATURE, BURY 6 - 8 INCHES DEEP
WAITING FOR PRIVATE COMFORT UPSETS NORMAL FUNCTIONS.

OE-13



OE-14

D. ELIMINATION OF BODY WASTES.

Waste elimination is a natural body function that occurs regularly in every living thing. The delay for better conditions or flush toilets can cause severe discomfort and loss of body efficiency.

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When group leaders do not stop for a party separation: "boys ahead - girls back" be vocal - explain your needs. It's your body, your discomfort, and continued travel will rapidly reduce your efficiency.

V. Outdoor ethics is your responsibility:

A. OUTDOOR ETHICS - When you enter the wild outdoors beyond the roadhead you leave civilization's amenities and controls behind. You must adhere to the unwritten laws of the wilderness: "To help man or beast in distress." Since you are the transgressor and a stranger walking upon the established territories of of wild animals, respect their domain. ***Remember*** - animals will fight for their territory.
- Leave no trace of your travel.
- Bury your feces.
- Use only dead fuel.
- Use only downed limbs for shelter.
- Be cautious with fire. (Uncontrolled fire can ruin the land for all living things.)

B. Travel anywhere in the natural environment by any means can do some damage to the living plants.
1. Use care in selecting camp and route.
2. Be aware that the small tree you step on or pollutant you leave may kill a living thing that has struggled many years to gain its foothold on life.

C. Your misconduct in the wild outdoors can often be seen for years and years. Put out your fire.

Accidents can happen, and only you can minimize their effect upon your person. When emergencies happen, the further you are away from assistance, the more dependent you will be upon your ability for self help and self sufficiency. Sometimes you may have to be your own doctor, mechanic, scavenger, forager, engineer, etc., doing what has to be done and improvising what you need from what you have.

★ *After a serious emergency all priorities must change from one of enjoyment to that of helping the victim.*

VI. Emergency Response

A. When an accident happens:
1. One person or group consensus must make decisions.
2. Initiate appropriate first aid.
3. Send outside for assistance.
4. Effect a self-rescue with what you have in the party.

B. Sending out for assistance takes time.
1. Many variables: Weather, terrain, distance, darkness, etc.
2. The team going out must travel to communications.
3. Alert appropriate officials with accurate data and location.
4. Time for rescue to organize and reach roadhead.
5. Time for rescue to find your location.
6. Time for rescue to accomplish evacuation.

C. Sometimes the overall time delay warrants a self-rescue effort.
1. Hobbling out can often create less discomfort than awaiting rescue help.

D. Signalling that you need help (communication without the spoken words).
   1. What are standard distress signals?
   2. Learn how to answer rescue signals and aircraft signals.
   3. Learn what to use, when, and how. Good signals lessen your Time Lag period.

PROPER TRIP PLANNING
WILL ALERT SEARCH AND RESCUE TEAMS WHEN YOU ARE OVERDUE.
Initial attempts will be made by hasty teams and aircraft.
• Attempt to respond to any attraction.
• Assume anyone you see or hear is rescue.

OE-15

SIGNALLING FOR AIRCRAFT RESCUE
MAKE SURE RESCUE CAN INTERPRET YOUR SIGNAL AS A SIGN OF DISTRESS!
INCORRECT!
A thumbs-up sign means 'I'm OK.'
Your broken leg may then not be noticed.

OE-16

SELF-INFLICTED MISERIES

Since you cannot eliminate all of the discomfort, you can minimize the misery by envisioning what you will be without. By projecting yourself ahead in time, to the area, to the activity, you may see those little items that will become necessary for personal comfort.

VII. EXTENDING YOUR ENJOYMENT:

A. Be alert for factors that affect your inner body, proficiency, and equipment use.

Wind chill
Frostbite
Minor cold effects
Minor heat effects
Heat cramps
Fatigue
Hypohydration

○○○○○○○○○

These can happen on a beach, in the city, at home, in the mountains, the tennis court, ball park, river, desert, or anywhere you may plan to go.

All can be ***cured*** *simply and easily. It only means you must recognize and act to provide what you need before they take away your enjoyment.*

B. Plan ahead for resting.

After strenuous exercise where your body is warm and the environment cold, plan to rest in a protected area and plan to put on extra insulation. Drink warm liquids and eat high-energy nibble foods.

After strenuous exercise in a hot environment, look for moving air in a shady area. Ventilate, drink cool water ***(not cold),*** replenish salt losses, and eat sparingly of high-energy foods. Lie-down rest is the best relief for muscles and mind. Your body must cool down and rebalance the circulatory system.

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C. Reducing discomfort during the activity.

Avoid tight, restrictive clothing. It interferes with necessary blood flow. Adopt a pace and work rhythm that allows normal heart and breathing. Maintain adequate energy and coolant input to offset your work usage. Insulate and ventilate as inner body temperature fluctuates with muscle heat production.

During long, slow, monotonous or repetitious activities, such as long snow climbs in foggy weather, keep your mind busy. Solve problems, sing songs, or relive other outings in pleasant places.

During very strenuous and fatiguing activities with little or no leadership responsibilities, reset your goals at each rest stop. Be realistic. Set a goal to reach the next creek or rest stop. Talk to yourself in a positive vein. "I'll make it to that tree." Refuel with sugar and water often. Cheer up others who are worse off.

Change uncomfortable clothing at a rest stop. Fresh dry socks do wonders for sagging morale. When your feet hurt, it affects your whole body.

Putting on head gear in heat or in cold environments will help your physical performance and mental outlook.

Move away from objectionable persons or negative talking participants.

Look ahead to the pleasant times at the end of the trail.

Stay on accustomed diets. Avoid any foods not suited for your body chemistry.

Stay clean and dry. Wash your face, hands, and feet.

Avoid allergy foods, drinks, and adverse environmental factors, such as poison ivy, insects, hay fever pollutants,

D. Before participating in strenuous activities:

Precondition those unused muscles that will be put to hard work. (Any preconditioning will help - the more the better.)

Recognize the stresses involved. Find a way to adjust or eliminate them.

Diet supplementation is always necessary for strenuous activities (before and after the trip).

Increased calcium strengthens bones for strenuous sports.

Avoid synthetics in your diet.

The following can be used as supplements by almost everyone:
High quality vitamins and mineral supplements in reasonable amounts.
Additional asorbic acid (Vitamin C).
Additional Vitamin E.
Additional calcium.

Basically our body cells are adapted to the cave man's diet of whole and unrefined foods that were cooked as little as possible. Highly refined, processed convenience foods often lack the nutrients necessary for strenuous muscle activity.

Start out the activity with a surplus of food, energy, water, salt, and the chemicals that are quickly lost in muscle use.

Plan ahead. You will have a more enjoyable trip.

BASIC CONCEPTS

FOR MANAGING A HUMAN BODY OUTDOORS

OBJECTIVE: To familiarize the student with the basic concepts relative to the physiology of heat production and temperature control.

DESIRED UNDERSTANDING:

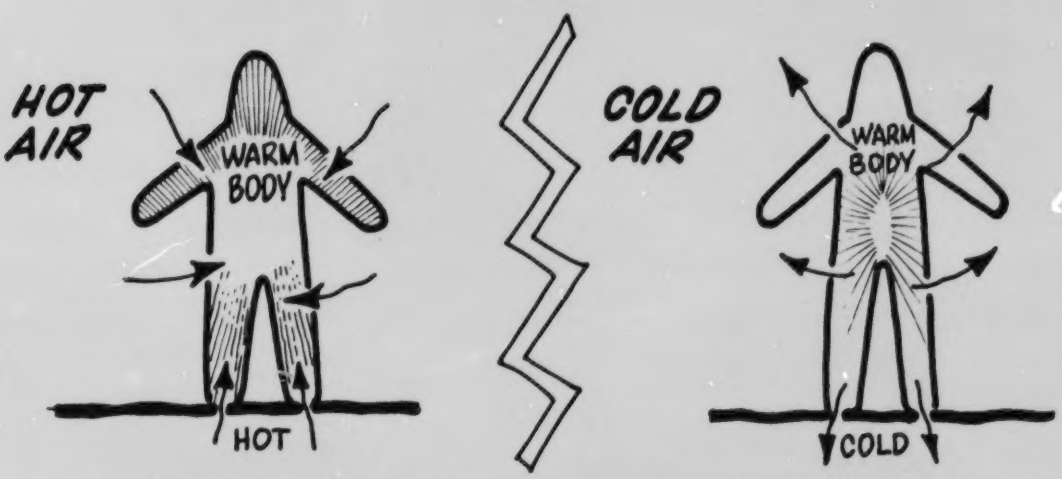
1. The principles of heat flow.
2. The principles of insulation.
3. The principles of the body's heat production and control.

I. The basic principles of *heat flow*.

A. Given 2 systems in contact, heat will flow from the higher temperature to the lower temperature.

In cold temperatures the body loses heat to the surrounding air; in higher temperatures the body gains heat.

OE-17



B. Heat flow occurs through several different mechanisms.

1. ***Radiation*** is the transfer of heat through the air in the form of electromagnetic waves.
2. ***Conduction*** is the movement of heat from molecule to molecule within a solid substance or from one object to another actually in contact with each other.
3. ***Convection*** refers to heat being carried by the moving particles of a fluid or gas.
4. ***Evaporation*** is the process by which a substance changes from a liquid to a gas. This process requires the addition of heat to the liquid. As the liquid evaporates this heat is then carried away.

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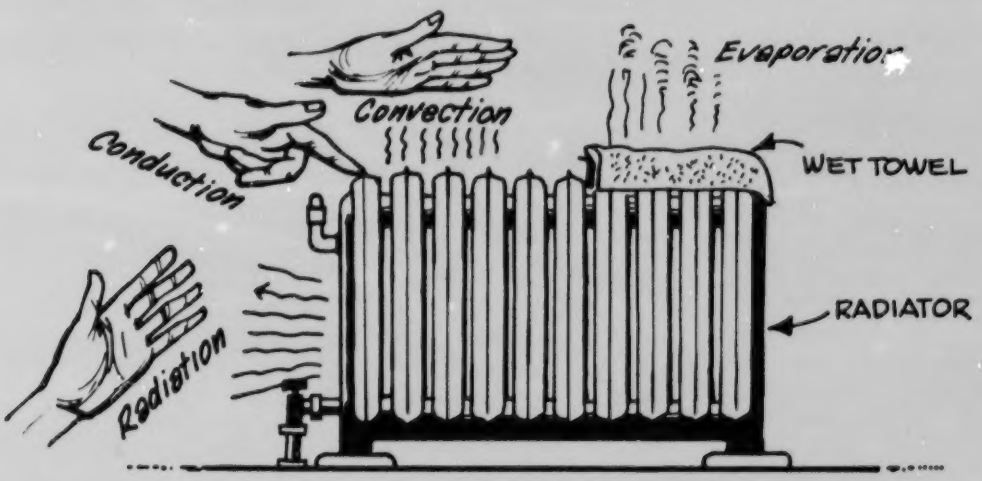
Example: During heavy exercise or on a hot day our bodies perspire. The perspiration collects on the skin. As this water evaporates it requires additional heat which it gets from the body, thus cooling the body.



OE 17 **METHODS OF HEAT TRANSFER**

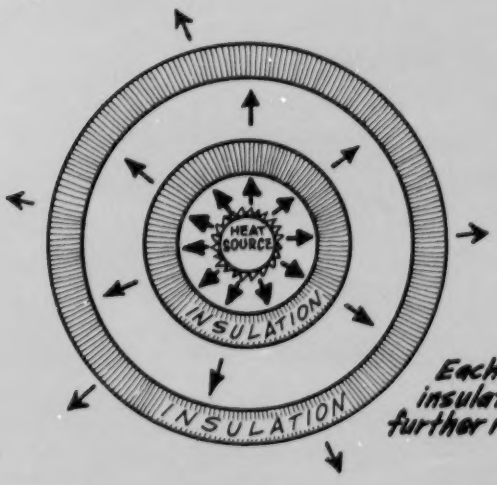
II. The principles of *insulation*.

A. HEAT LOSS CAN BE SLOWED, NOT STOPPED.

1. ***Radiation*** heat loss is slowed by any opaque surface.
2. ***Convection*** heat loss rate is a function of the speed of movement of the surrounding air or water.
3. ***Conduction*** heat loss rate is a function of the surface area and thickness of the object, the relative temperatures and the material itself.

B. ***Insulation*** is a relative term expressing the degree with which a material will slow the heat flow away from an object.

1. INSULATION SLOWS HEAT LOSS; IT DOES NOT CREATE HEAT.



Each layer of insulating material further retards heat flow.

OE-18

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2. The relative insulating value of some common materials is:

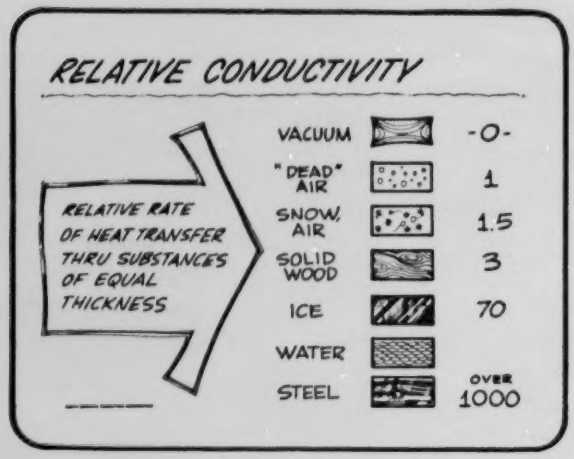
   Air - 1 (non-moving air is the best available natural insulation.)

   Wood - 3

   Ice - 70

   Steel - 1930

   As a means of interpreting these figures, we can say that steel conducts heat away 1930 times as fast as still air.



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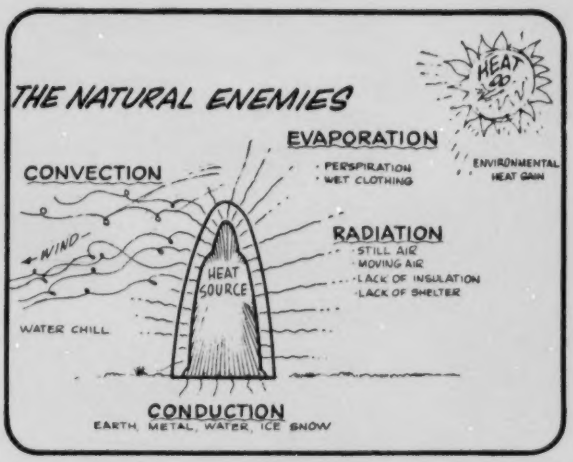


OE-20

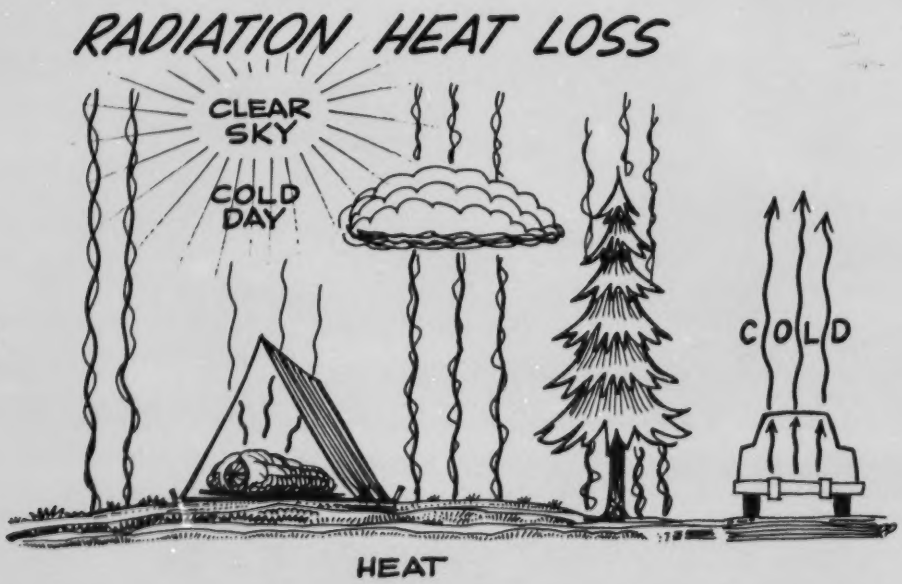
3. Insulation must be considered from the heat source to the cosmos:

   a. ***Clothing*** thickness and insulating properties determine the initial heat loss due to all causes.

   b. For ***sleeping***, the thickness and structure of the sleeping bag further slow heat loss due to radiation, convection, and conduction.

   c. A tent or other ***shelter*** slows convection and radiation heat losses.

   d. ***Tree covering*** and even ***sky cover*** (clouds) help to retard radiation cooling.



OE-21

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III. **The body is a super efficient *heat-producing machine*** that operates at maximum efficiency at a core temperature of 99°F.

A. The ***Basal Metabolism Rate*** (BMR) is a measure of the heat output of the resting, but awake, individual. The BMR then represents the minimum amount of heat generated by body cells to maintain the vital functions, e.g., circulation and respiration.

1. Factors influencing BMR:

a. ***Size*** - The BMR for an individual in his twenties is approximately 40 calories per square meter of body surface per hour. The average surface area of American adults is 1.6 square meters for women and 1.8 square meters for men.

b. ***Sex*** -For a given size the BMR for men is 5% to 7% higher for men than women.

c. ***Age*** - The BMR increases slightly during the first 3 to 6 years, then decreases throughout life.

d. ***Thyroid hormone*** - BMR is a direct function of the level of thyroid secretion.

e. ***Fever*** - BMR increases about 13% per degree C. rise in body temperature.

f. ***Drugs*** - Certain drugs increase BMR, e.g., caffine, Benzedrine.

g. ***Sleep*** - BMR is reduced by 20% during sleep.

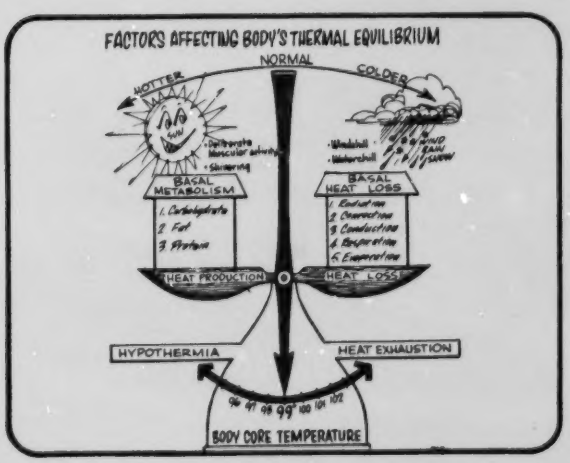
B. ***Total Metabolic Rate*** represents the total amount of heat produced in the body in a given time under normal conditions.

1. ***Exercise*** or ***muscular work*** of any kind increases metabolic rate.

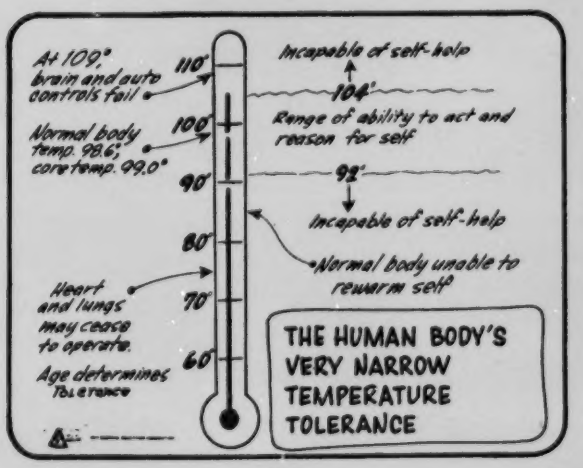
2. ***Food ingestion*** and ***digestion*** increase metabolic rate.

a. Muscular work of ingestion and digestion increase metabolism.

b. The food itself triggers a metabolic rate increase. A mixed diet increases heat output by 10%, pure fats by 4%, carbohydrates by 6% and straight protein by 30%!



OE-22



OE-23

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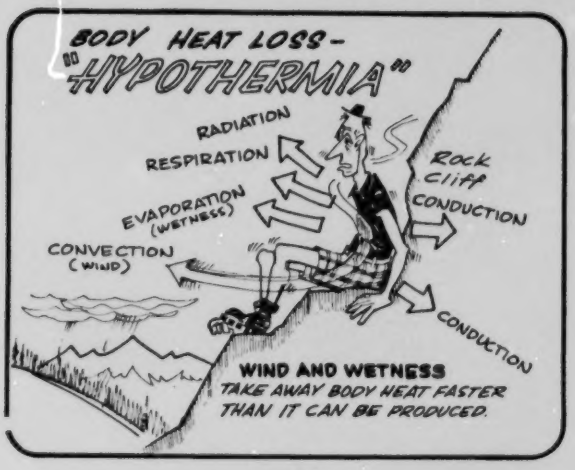
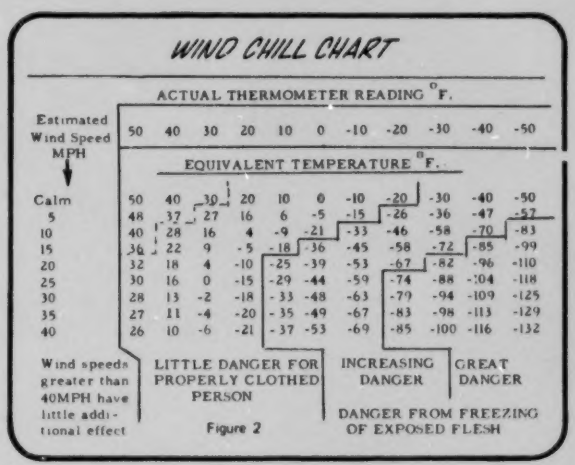
C. ***Heat loss*** **from the body.**

1. **From the *skin*.**
   a. **About 80% to 85% of all heat lost from the body is lost through the skin.**
   b. **Conduction accounts for only small heat loss.**
   c. **Radiation is the leading cause of heat loss.**
   d. **Evaporation, at moderate temperatures, accounts for 1/2 as much heat loss as radiation. At high environmental temperatures evaporation is the only method by which heat can be lost through the skin.**
2. **From the *lungs* in the expired air through convection and evaporation.**
3. **From the *digestive* and *urinary tracts* by warming cold foods and liquids through conduction and convection.**
4. ***Windchill*** **is the cooling effect of moving air (wind) over the skin surface.**

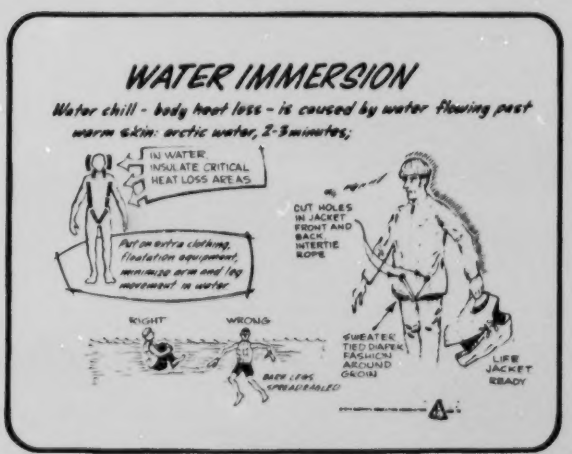


OE-24


WIND CHILL CHART
ACTUAL THERMOMETER READING °F.
Estimated Wind Speed MPH
50 40 30 20 10 0 -10 -20 -30 -40 -50
EQUIVALENT TEMPERATURE °F.
Calm 50 40 30 20 10 0 -10 -20 -30 -40 -50
5 48 37 27 16 6 -5 -15 -26 -36 -47 -57
10 40 28 16 4 -9 -21 -33 -46 -58 -70 -83
15 36 22 9 -5 -18 -36 -45 -58 -72 -85 -99
20 32 18 4 -10 -25 -39 -53 -67 -82 -96 -110
25 30 16 0 -15 -29 -44 -59 -74 -88 -104 -118
30 28 13 -2 -18 -33 -48 -63 -79 -94 -109 -125
35 27 11 -4 -20 -35 -49 -67 -83 -98 -113 -129
40 26 10 -6 -21 -37 -53 -69 -85 -100 -116 -132
Wind speeds greater than 40MPH have little additional effect
LITTLE DANGER FOR PROPERLY CLOTHED PERSON
INCREASING DANGER
GREAT DANGER
DANGER FROM FREEZING OF EXPOSED FLESH
Figure 2

OE-25

5. ***Waterchill*** **is the increased cooling rate produced by wet clothing or immersion in cold water. This rate of cooling can be many times that of dry clothing or air.**


WATER IMMERSION
Water chill - body heat loss - is caused by water flowing past warm skin: arctic water, 2-3 minutes;
IN WATER INSULATE CRITICAL HEAT LOSS AREAS
Put on extra clothing, floatation equipment, minimize arm and leg movement in water
CUT HOLES IN JACKET FRONT AND BACK INTERTIE ROPE
RIGHT
WRONG
BACK LEGS SPREAD-EAGLED
SWEATER TIED DIAPER FASHION AROUND GROIN
LIFE JACKET READY

OE-26

TIP: When you are accidentally dumped into cold water **KEEP ALL CLOTHES ON.** Clothing reduces the flow of cold water by your warm skin. Water removes heat 32 times faster than air.

IF ON A SINKING BOAT WITH GOOD LIFE JACKETS -
Put on several wool sweaters, and pants. Cover with winter jacket tied between the legs to keep from floating up. Tuck pants into sock tops. THEN PUT ON LIFE JACKET. Try to stay in a fetal position and minimize all movement. Water chill steals body heat fast, fast, fast . . .

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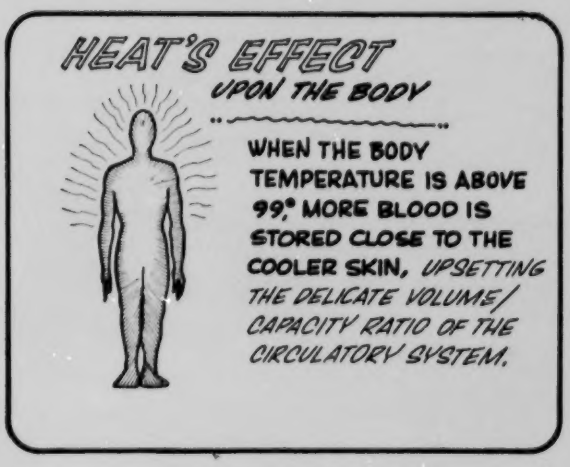
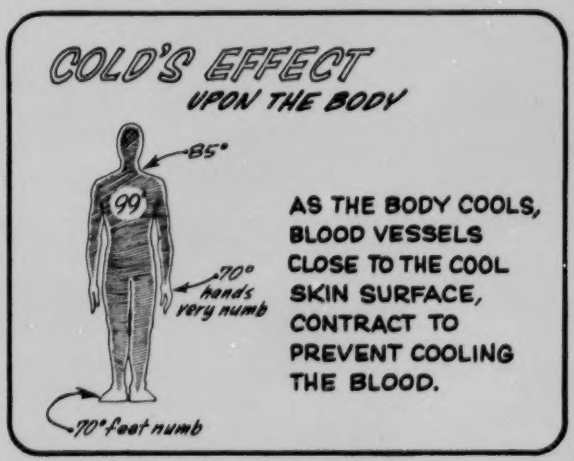
D. If there is any change in the body's optimum core temperature of approximately 99°F. then the body's ***defense mechanisms*** make necessary adjustments to restore the core temperature.

1. The ***heat-regulating centers*** regulate the amount of heat produced and dissipated. They are controlled primarily by reflex mechanisms (skin heat and cold receptors) and secondarily by the blood temperature.
2. ***Overheating*** responses.
   a. Heat production is slowed.
   b. Surface blood vessels dilate to increase surface blood flow. This allows for additional heat loss by radiation and convection.
   c. Increased sweat secretion increases cooling through evaporation.
3. ***Overcooling*** responses.
   a. Surface blood vessels constrict to reduce surface blood flow, thus lessening the amount of heat lost by radiation and conduction.
   b. The sweat glands are inhibited to prevent heat loss by evaporation.
   c. Shivering begins, thus increasing heat production through muscular work.


HEAT'S EFFECT
UPON THE BODY
WHEN THE BODY TEMPERATURE IS ABOVE 99°, MORE BLOOD IS STORED CLOSE TO THE COOLER SKIN, UPSETTING THE DELICATE VOLUME/CAPACITY RATIO OF THE CIRCULATORY SYSTEM.

OE-27


COLD'S EFFECT
UPON THE BODY
85°
99°
70° hands very numb
70° feet numb
AS THE BODY COOLS, BLOOD VESSELS CLOSE TO THE COOL SKIN SURFACE, CONTRACT TO PREVENT COOLING THE BLOOD.

OE-28

The human body has a fantastic heating system and a relatively poor body cooling system. You can generally reduce heat loss with additional insulation or shelter. You can even increase your heat production for short periods of time. But you may be hard pressed to find anything to support body cooling on the hot desert or during periods of high humidity.

Insulation or ventilation is your responsibility. You are managing 32,000,000,000,000 living cells that function best at near 99° inner body core temperature. These vital living cells generate the energies of life that are so necessary for comfort, enjoyment and efficiency.

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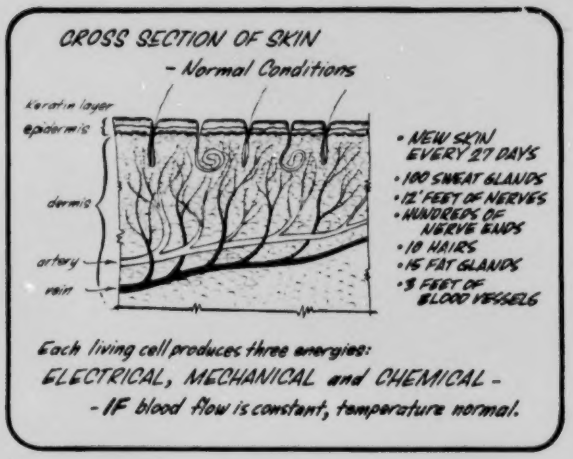
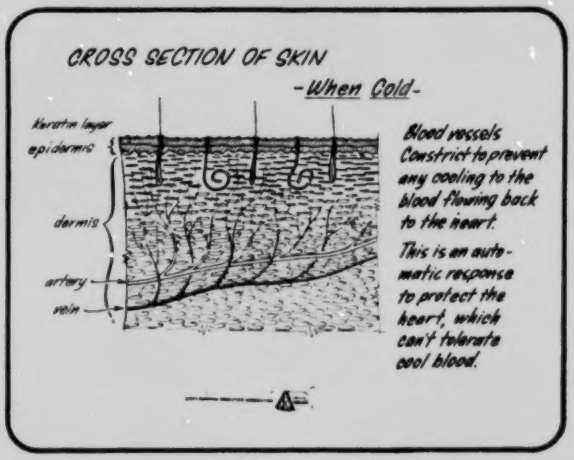


OE-29

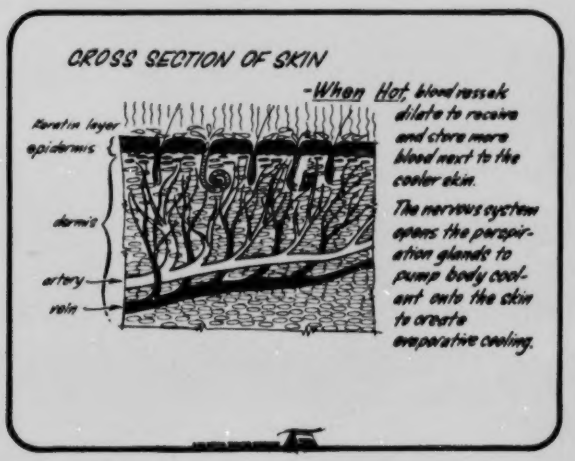
YOUR BODY'S FIRST LINE OF DEFENSE AGAINST HEAT GAIN AND HEAT LOSS

YOU HAVE APPROXIMATELY 5 to 8 sq. ft. OF SKIN SURFACE TO PROTECT AND MANAGE


CROSS SECTION OF SKIN
-When Cold-
Keratin layer
epidermis
dermis
artery
vein
Blood vessels Constrict to prevent any cooling to the blood flowing back to the heart.
This is an automatic response to protect the heart, which can't tolerate cool blood.

OE-30

YOU MUST MANAGE THIS WITH INSULATION OR VENTILATION


CROSS SECTION OF SKIN
-When Hot, blood vessels dilate to receive and store more blood next to the cooler skin.
Keratin layer
epidermis
dermis
artery
vein
The nervous system opens the perspiration glands to pump body coolant onto the skin to create evaporative cooling.

OE-31

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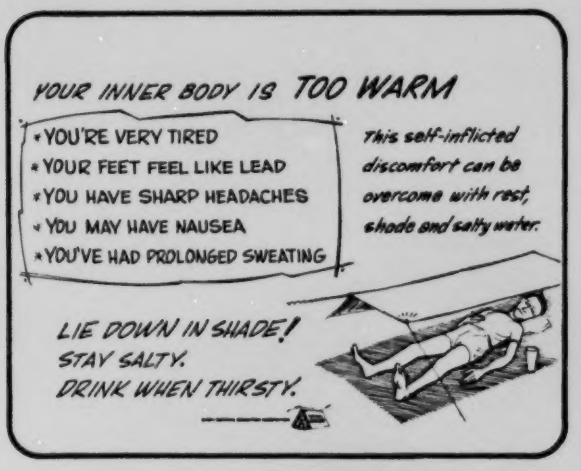

YOUR INNER BODY IS TOO WARM
* YOU'RE VERY TIRED
* YOUR FEET FEEL LIKE LEAD
* YOU HAVE SHARP HEADACHES
* YOU MAY HAVE NAUSEA
* YOU'VE HAD PROLONGED SWEATING
This self-inflicted discomfort can be overcome with rest, shade and salty water.
LIE DOWN IN SHADE!
STAY SALTY.
DRINK WHEN THIRSTY.

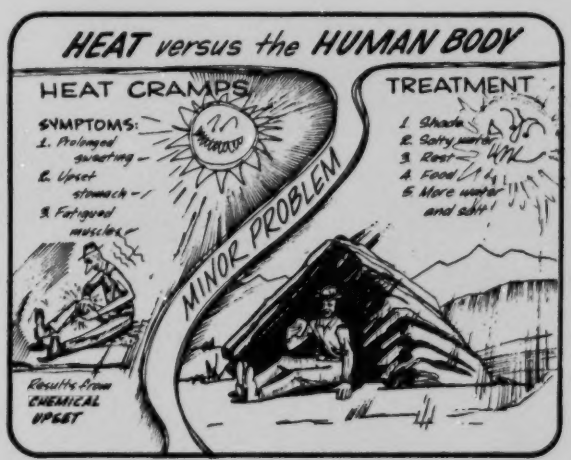
OE-32

YOU MUST ANALYZE
your heat gain from the activity
heat gain from the environment
amount of sweat loss
amount of energy loss

AGAINST
water supplies on hand
water supplies in the body
nearness of resupply

SLOW DOWN WATER LOSS
conserve what you have.

GOOD BODY MANAGEMENT WATER SALT REST AND SHADE ADDS TO ENJOYMENT



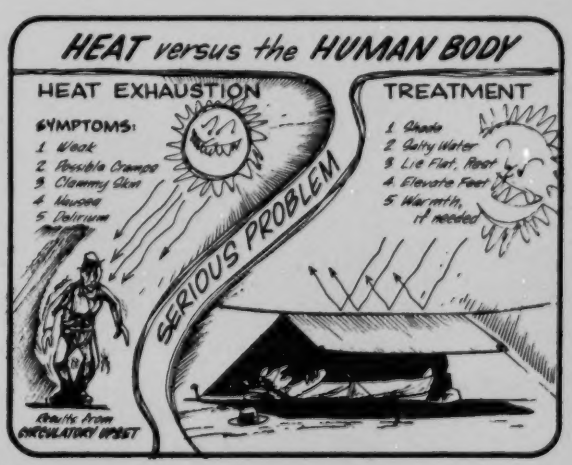
OE-33

DANGERS
Brain quickly loses ability to solve the problem of what is causing the discomfort leading to a do-nothing syndrome.

Symptoms Headache
Muscles weak
Nausea

Treatment When symptoms are not cured with pills Try shade and water Salt and rest.

Dangers Your brain quickly loses the ability to solve the problem of what is causing this discomfort . . . This leads to a do-nothing attitude.



OE-34

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E. If the body's mechanisms cannot correct abnormal core temperatures the following will result:

1. Heat effects - ***Hyperthermia.*** (heat gain). See page 28
2. Cold effects - ***Hypothermia.*** (heat loss).

Symptoms relative to body core temperature: (subject to age considerations).

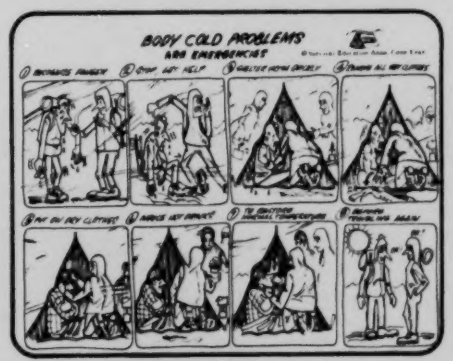
99°F to 96°F	Intense shivering.
95°F to 91°F	Violent shivering, sluggish speech and thinking.
90°F to 86°F	Shivering decreases, muscular rigidity. Loss of muscular coordination, less clear thinking. Possible amnesia.
85°F to 81°F	Irrational, loss of contact, muscular rigidity. Slowed respiration and pulse.
80°F to 78°F	Unconsciousness, failing reflexes, erratic heartbeat.
Below 78°	Death.

YOUR INNER BODY IS TOO COOL
* SKIN CHILL, SHIVERING
* EXPOSED FLESH NUMB
* EXCESSIVE TIREDNESS
* POOR MUSCLE RESPONSE
* POOR SPEECH, MEMORY
Cold injuries are self-inflicted and preventable.
REWARM WITH
warm, sugary liquids; more insulation, wind barrier, exercise
STOP EXPOSURE TO WIND, WETNESS and COLD

OE-35

Danger
Brain quickly loses the ability to think, or understand what is causing the discomfort . . .

This creates a do-nothing attitude.



OE-36

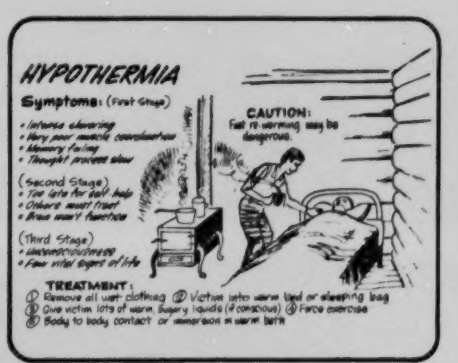
ANY NON-CONDUCTIVE INSULATION HELPS PREVENT THIS DANGER.

Symptoms . . . Shivering

Treatment . . . Seek warmth
Remove wet clothing, put on dry clothes.
Drink warm liquids.

Some cold problems are obvious. Others are so subtle you do not feel or see their damaging affects.

Be alert for wind chill and water chill's insidious effect on your limited energy and vital organs.



OE-37

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PLANNING

WHY PLAN FOR OUTDOOR ENJOYMENT?

Actually, enjoyment is a state of mind, self-created by forethought and conscious avoidance of discomforting situations. Minor physical or mental challenges encountered are generally temporarily stimulants. To enjoy an outdoor activity, one must be physically and mentally comfortable.

This state of mind is acquired by assuring yourself that you will have what you need for comfort when you need it, and that the activity is within your range of experience and physical capabilities.

Planning enters into your outdoor enjoyment in many ways. By thinking ahead, you have thought out the prerequisites for enjoyment. "I will need this to do that, and this to protect me from weather." In reality, you are thinking far ahead of your actions. Like an auto driver is thinking three or four blocks ahead so he'll be in position to exit when he wants to. Airplane pilots, because of their speed, need to think 400 miles ahead of their plane so as to allow for weather, traffic, fuel, altitude, etc. Outdoorsmen must plan ahead one hour, one day, or two days.

There are only two kinds of threats to outdoor travel - expected and unexpected. You can enjoy the expected because you have prepared for it with extra defenses. It is the unexpected that causes quick loss of enjoyment.

It is impossible to plan for all unexpected situations. But humans, with their analytical ability, can lessen the degree of discomfort through understanding what is causing the discomfort and improvising a defense.

Most experienced outdoorsmen actually travel the complete trip in their minds before they leave home. They do this so that they will have the resources to eliminate or lessen the degree of discomfort.

Strenuous outdoor recreation or unexpected emergencies that force humans outdoors amid the ever-present dangers of nature force humans to suffer the consequences of their actions. The many variables of terrain, weather, and environmental hazards must be balanced against the limitations of inner human resources and the learned knowledge of self-preservation. Self-reliance in the outdoors comes from knowing what you need, to protect what you have from whatever could harm it.

PLANNING

OBJECTIVE: To familiarize the student with the factors involved in planning outdoor activities.

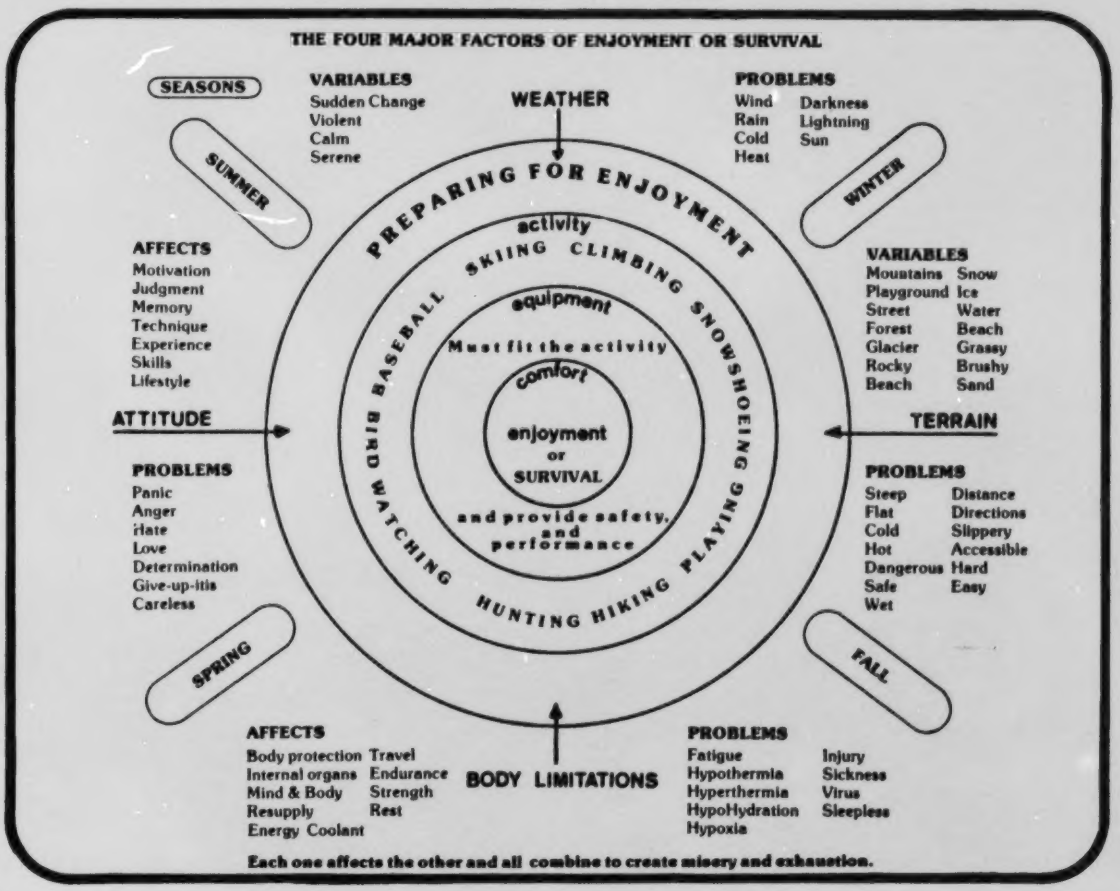
DESIRED UNDERSTANDING:

1. The ultimate goal of outdoor activities is comfort and enjoyment.
2. All outdoor activities have a common planning base.
3. Certain factors influence clothing and equipment planning selection.
4. Planning must include transportation considerations.
5. The individual must accept certain responsibilities that are a function of the activity in which he is engaged.

I. The Planning Target.

A. The ultimate goal of outdoor recreational activities is ***enjoyment.***

B. Mental and physical ***comfort*** are necessary for enjoyment.



OE-38

C. For a given activity, proper ***equipment*** selection can provide comfort.

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D. Equipment selection is based primarily on four ***external influences:***

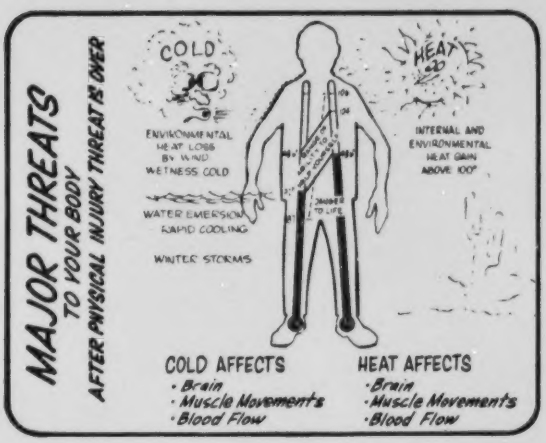
1. Weather – anticipated.

   The ***National Weather Service forecasts*** have improved with modern technology (satellite photos, meteorological research). Complicated topography (mountains, water, complex mountain ranges) reduce the accuracy of forecasts.

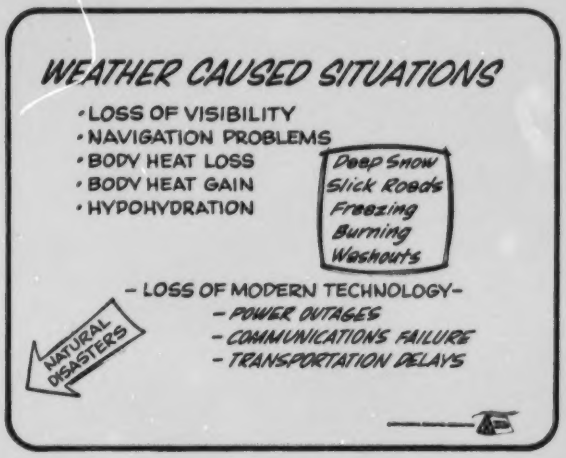
   Prevailing weather can be determined from local weather records. The National Weather Service maintains records for more than 15,000 land and sea stations. Data for these locations include temperature and precipitation averages and extremes and other climatological phenomena .

   Past experience in a given locale over a period of years can create an intuitive as well as objective evaluation of the anticipated weather. For example, Cascades hikers and climbers have little experience with lightning whereas mountain travellers in the Rocky Mountains must consider this phenomenon almost daily.

   Local residents can provide weather information in areas strange to the individual.



OE-39



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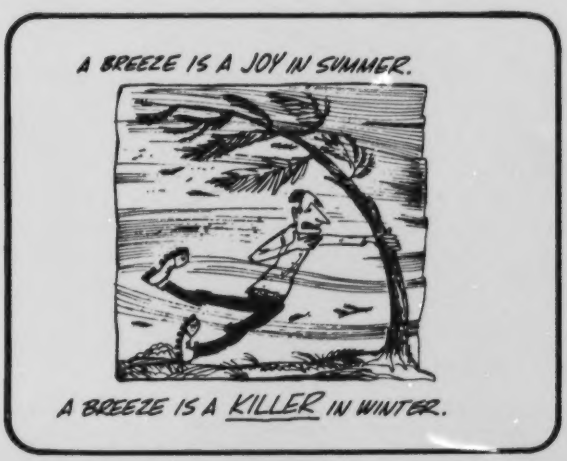

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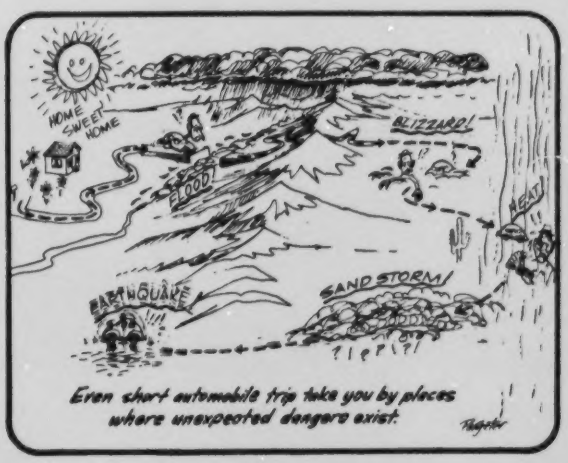

OE-42

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2. Terrain considerations include:

   Length of trip – Time and distance.
   General terrain – Mountains, water, desert, vegetation.
   Ground condition – Snow, water, mud, sand, rocks.
   Roads and trails – Travel conditions.
   River and bridge conditions – Flooding and crossings.
   Available water – For drinking.
   Transportation – To area of activity.

   Sources of information:

   Maps, depending on type and publishing date, provide information on roads, trails, and topography.

   Trail guides provide detailed information on trail conditions, campsites, water availability and horsefeed as well as flora and fauna.

   Photographs, especially aerial photos, can provide accurate up-to-date information on general terrain conditions.

OE-43

OE-44

Forest and Park ***Rangers*** should be able to provide the latest terrain information. However, their duties frequently keep them behind a desk. Therefore, the information they have is only as accurate as that given to them by others who have been in the area. Upon return each party should report any unexpected conditions to the Rangers so that future parties will have up-to-date information.

Other individuals who have recently been in an area of interest can provide up-to-date information.

3. Body limitation factors are:

   The overall ***size*** of the party. Normally a minimum of three is recommended for safety.

   The overall ***strength*** of the party. Consideration must be given to age, physical strength and stamina of each party member. Individual physical handicaps and potential medical problems must be known to other party members.

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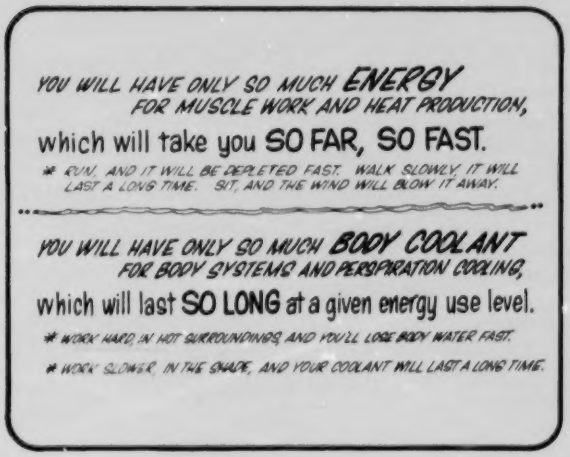
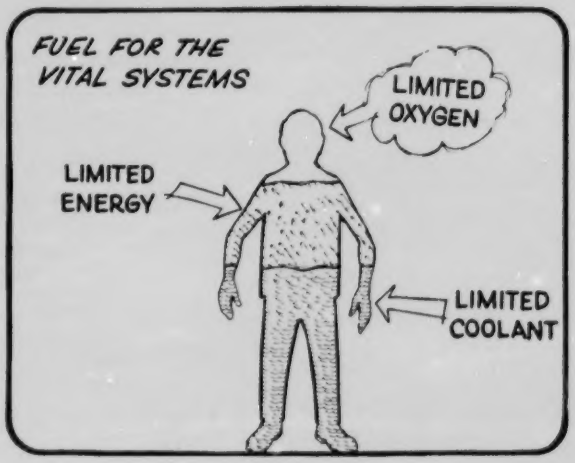
Energy foods, fuel and liquids become critical limiters with an increase in speed of travel, steepness or distance.


YOU WILL HAVE ONLY SO MUCH ENERGY FOR MUSCLE WORK AND HEAT PRODUCTION,
which will take you SO FAR, SO FAST.
* RUN, AND IT WILL BE DEPLETED FAST. WALK SLOWLY, IT WILL LAST A LONG TIME. SIT, AND THE WIND WILL BLOW IT AWAY.
YOU WILL HAVE ONLY SO MUCH BODY COOLANT FOR BODY SYSTEMS AND PERSPIRATION COOLING,
which will last SO LONG at a given energy use level.
* WORK HARD IN HOT SURROUNDINGS, AND YOU'LL LOSE BODY WATER FAST.
* WORK SLOWER, IN THE SHADE, AND YOUR COOLANT WILL LAST A LONG TIME.

OP-45



OE 46

4. Mental Attitude Considerations are:

   Age **and** ***experience*** **determine attitudes to a large degree.**

   Compatibility **of party members is important, especially on a longer trip. On an expedition, where two or more individuals may be storm-bound in a tent for several days, compatibility is all-important.**

   Trip objectives **must be kept flexible. The all-or-nothing attitude leads to accidents.**

   Negative attitude can quickly replace enjoyment and confidence with misery and worry.

II. Equipment Planning.

A. Organization into categories based on primary functions:

Body Protection	**Comfort Survival**	**Direction Finding**
First aid kit	Matches	Map
Sun Protection	Firestarter	Compass
Emergency shelter	Knife	Flashlight
Emergency clothing		
Emergency food		
Water		
Eating	**Sleeping**	**Moving**
Cooking gear	Shelter	General clothing
Stove	Sleeping bag	Backpack
Food	Sleeping pad	

Construct equipment lists for different activities, e.g., hiking, boating. Use the above headings.

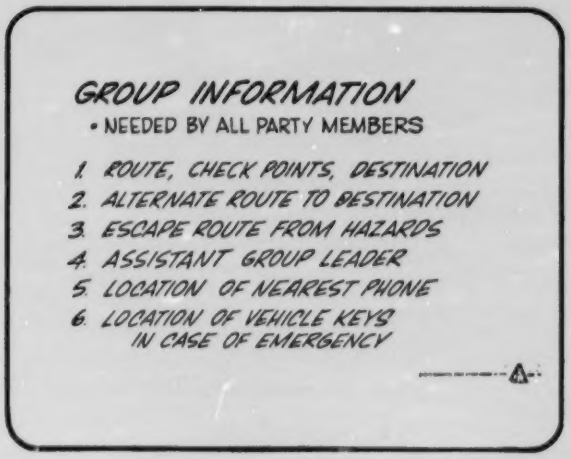
B. Consideration must be given to individual equipment needs as well as group requirements.

The essentials should be carried by each individual.

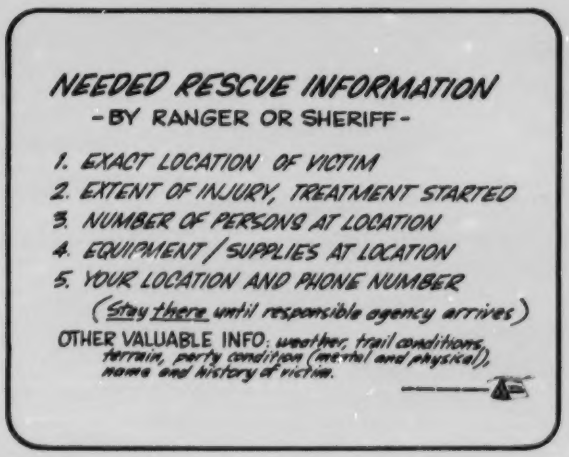
Tents and cooking gear are generally considered group items.

C. Proper equipment is 100% effective only if the user has the knowledge and skill to utilize the equipment to its fullest capacity.

III. Certain information should be known by all party members in case of emergency:


GROUP INFORMATION
• NEEDED BY ALL PARTY MEMBERS
1. ROUTE, CHECK POINTS, DESTINATION
2. ALTERNATE ROUTE TO DESTINATION
3. ESCAPE ROUTE FROM HAZARDS
4. ASSISTANT GROUP LEADER
5. LOCATION OF NEAREST PHONE
6. LOCATION OF VEHICLE KEYS IN CASE OF EMERGENCY

OE 47


NEEDED RESCUE INFORMATION
- BY RANGER OR SHERIFF -
1. EXACT LOCATION OF VICTIM
2. EXTENT OF INJURY, TREATMENT STARTED
3. NUMBER OF PERSONS AT LOCATION
4. EQUIPMENT / SUPPLIES AT LOCATION
5. YOUR LOCATION AND PHONE NUMBER
(Stay there until responsible agency arrives)
OTHER VALUABLE INFO: weather, trail conditions, terrain, party condition (mental and physical), name and history of victim.

OE-48

IV. Vehicular transportation considerations must include the same planning factors:

Anticipated weather – Antifreeze, gasoline, oil, water, visibility.

Terrain conditions – Roads, bridges, ground cover, general terrain.

Mechanical limitations of vehicle – General condition, availability of repair facilities.

Mental attitudes – As important to the operation of a vehicle as to the performance of the individuals involved.

Mechanical problems influence enjoyment almost as quickly as weather. They can also create an emergency that leaves you too far from civilization to walk back.

V. If an emergency does occur the rescue authorities will need the following information from those who go for help:

All members should know how to acquire emergency assistance in strange areas. Mountains, flatlands, sea, desert, etc.

Whom to contact for emergency assistance:

- Park Rangers, County Law Enforcement officials, or State Police. They can contact effective response assistance.

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VI. The individual must accept certain responsibilities relating to the activity in which he is engaged.

To private property –Get permission to trespass.
Avoid damaging fences, trails, personal property.

To others in the party –Stay with the party.
Be courteous and considerate.

To the leader – Keep him aware of your whereabouts, physical condition and equipment.

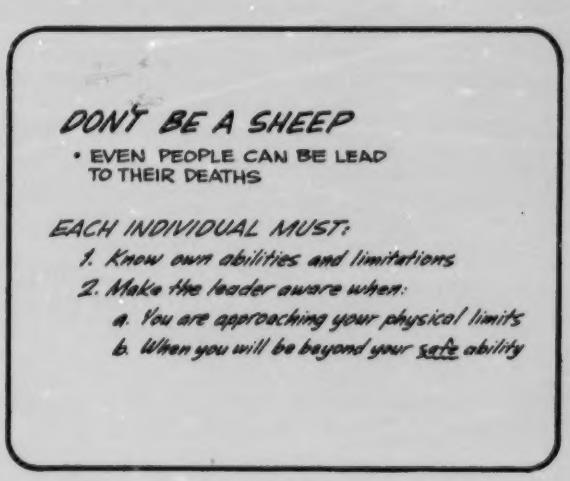
To your family -- Leave a trip schedule. Let them know where you are going and when you plan to return.

To authorities -- They are there for your protection and to assist you in having an enjoyable trip. Abide by the rules.

To others -- Take care of the wilderness. Preserve it for others or for the next time you want to use it. Avoid noise pollution.

To yourself -- Accept the responsibilities listed above. Be prepared to handle any contingencies. Learn the techniques and hazards of the activity in which you are engaged.

OE-49


DONT BE A SHEEP
• EVEN PEOPLE CAN BE LEAD TO THEIR DEATHS
EACH INDIVIDUAL MUST:
1. Know own abilities and limitations
2. Make the leader aware when:
a. You are approaching your physical limits
b. When you will be beyond your safe ability

OE-50

Whenever a person voluntarily joins a group, he must give up his rights of individualism for the welfare of the group.

Everyone shoulders the responsibility for maintenance of his or her inner body and its refueling or protection. This happens because only you can read of the inner body's problem indicators. These tell-tale signs indicate the thermal and physical state of the body at that moment. The body problem indicators tell you what is being mismanaged and only you can act to correct that deficiency.

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EQUIPMENT

OBJECTIVE: **To familiarize the student with the general equipment required for safe and enjoyable outdoor travel.**

DESIRED UNDERSTANDING:

1. **The essential equipment basic to any outdoor situation.**
2. **The clothing requirements for outdoor use.**
3. **The factors involved in equipment selection.**
4. **The principles of improvisation.**

EQUIPMENT

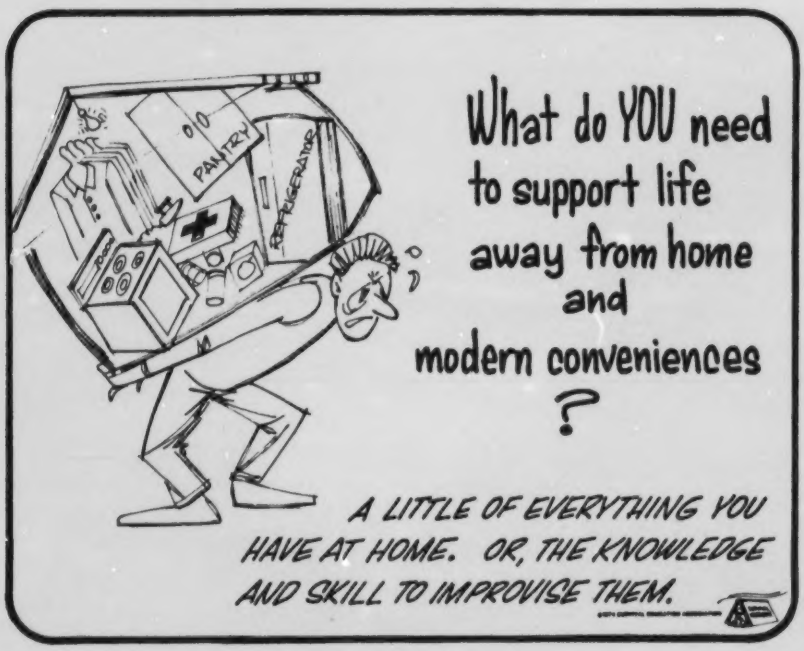
The Indian traveled far and wide with only his "possibles" bag. Pioneer scouts crossed the country with a bedroll and saddlebags. But modern man requires more to enjoy the same environment. Why? Mostly because his body is not physically conditioned nor acclimatized to the temperature extremes and the discomforts his forefathers condoned.

I. The Essentials – Why?

A. **The essentials are the minimum equipment for safe outdoor travel.**

B. **The essentials should be carried on any outdoor trip – a short day hike or an extended backpack trek.**

C. **Each person in a group must carry his own essentials.**


PANTRY
REFRIGERATOR
What do YOU need to support life away from home and modern conveniences ?
A LITTLE OF EVERYTHING YOU HAVE AT HOME. OR, THE KNOWLEDGE AND SKILL TO IMPROVISE THEM.

OE-51

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II. The Essentials – What?

A. The essentials can be categorized under three fundamental headings.

OE-52

PATCHING UP
REFUELING
AND
PROTECTING
YOUR BODY

To manage your inner body's temperature.

TOOLS TO PROVIDE LIFE SUPPORT

Valuable in managing body temperature
Signalling
Cooking
Drying

TRAIL ESSENTIALS
• FOR COMFORT AND/OR SURVIVAL, YOU NEED:
-MATCHES-
-CANDLE-
FOR WET WOOD FIRE STARTING
ENCASED IN WAX FOR EMERGENCY
IN WATERPROOF PACKAGE FOR NORMAL USE
-JACKKNIFE-
YOUR ONLY TOOL FOR REPAIR AND CUTTING
PRACTICE WET WOOD FIRE BUILDING BEFORE AN EMERGENCY ARISES
NOTE: STOVES ARE NECESSARY AND OFTEN REQUIRED IN WILDERNESS ENVIRONMENTS

OE-53

TRAIL ESSENTIALS
• FOR DIRECTION FINDING, USE THESE:
- MAP VARIETY -
STATE ROAD MAP
BACK ROAD AND TRAIL MAP
TOPO-GRAPHIC MAP
-FLASHLIGHT-
-COMPASS-
NOTE: THESE ARE ONLY HELPFUL IF YOU KNOW HOW TO USE THEM. THE MAPS MUST BE CURRENT, THE FLASHLIGHT OPERABLE.

OE-54

DIRECTION FINDING

Allows a return to starting point.

Necessary for pinpointing your exact location when there are no street signs.

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B. For body protection.

1. The ***first aid kit*** should be adequate to treat a serious injury – fracture, serious bleeding, etc. Medical assistance may be hours or even days away.

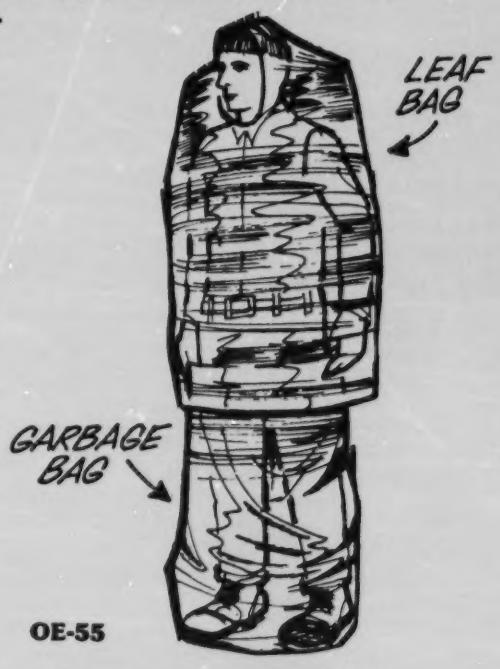
Reference: *Mountaineering First Aid*, Dick Mitchell 1972.
See appendix Recommended First Aid Supplies

2. ***Emergency food*** should be reserved for emergency use only. Two schools of thought exist on emergency food: (1) It should be tasty to provide a psychological lift in an emergency, or (2) it should approach inedibility so it will not be eaten unless an emergency does arise.

3. ***Water*** needs must be based on both quantity and quality. The first consideration is the availability of drinking water. Secondly, the purity of the water must be considered. Third, a secure means of carrying it.

4. ***Emergency clothing*** should be separately wrapped in plastic to make sure it is dry when needed. Recommended minimum is a wool sweater and a spare pair of wool socks. Wool socks can double as emergency mittens.

5. An unexpected storm can create an immediate need for ***body shelter*** more than just clothing. Some protection from wind and rain must be provided. This protection can range from windproof, waterproof clothing to a tent.



OE-55

6. ***Sun protection*** must be provided for any part of the body that is exposed to the harmful ultraviolet rays of the sun. The burning effects increase considerably at high altitudes and near snow or water. The rays "bounce" from snow and water and on hazy or bright "foggy" days the rays diffuse and come at the body from all directions. Commercial preparations now allow any degree of sunburn protection.

(Remember, sunburn can incapacitate you.)
Sunburn and sun blindness are self-inflicted discomforts which can be avoided.

The eyes must be protected from a variety of sun produced factors. The ultraviolet rays are the most damaging, infrared to a lesser degree. Only glass lenses will filter both; plastic lenses will not filter infrared. In addition the eyes must be protected from fatigue-producing glare. Glasses or goggles should provide protection from the sides, above, and below.

The less a person has with him, the less distance he can enjoyably travel away from resupply. The more hostile the elements, the more he must provide for comfort and sustenance.

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C. For Comfort and survival.

1. A ***knife*** is used primarily for cutting. Other uses are for equipment repairs (screwdriver, leather punch, file, . . .) and first aid needs (tweezers, sharp cutting blade).

   The unexpected emergency that takes away modern man's familiar comfort equipment necessitates his return to basic needs. The simple tools that can patch his body, refuel it and protect it, are readily available from Nature and our homes. A few multi-purpose tools, when combined with the pioneer's knowledge, could provide the security, warmth, and comfort necessary to change a situation from misery to enjoyment.

2. ***Matches*** are needed to start fires, light stoves, or sterilize needles for first aid purposes. They must be waterproofed. Waterproof matches are available at most outdoor equipment stores. Wooden matches can be waterproofed at home by dipping the heads in melted paraffin. If the matches require a striker for lighting, the striker must be carried ***and kept dry.***

   Note: Care must be exercised in the use of windproof-waterproof matches that are available in many store. The burning material contains phosphorous. Once ignited it will burn (even underwater!) until completely oxidized. Carelessly handled, these matches can produce painful chemical burns or unwanted fires, e.g., sleeping bag or tent fires.

3. ***Firestarter*** is a material that will sustain a flame and generate enough heat to bring wood to the burning point. A match is generally adequate for dry wood. However, wet wood requires a more sustained flame to dry the wood sufficiently to cause combustion. A common and readily available firestarter is a short section of candle. Several commercial firestarters are available ranging from chemical "heat tabs" to a toothpaste-like material that is smeared on a piece of wood to provide a continuing flame.

Recommended reading: "To Build a Fire" by Jack London.

D. For navigation.

1. A ***flashlight*** is essential for safe travel on or off the trail at night. Consider weight, extra battery weight, and usable life of the batteries.It is best to carry the batteries outside the flashlight to prevent accidental switching-on in the pack or pocket. Simply reversing the batteries within the flashlight is effective for some flashlights, not for others, depending on the design of the flashlight. An extra bulb and extra batteries should be carried.

   An example of the need for each person to carry his own Essentials:

   A climbing party of 12 set off on an intended one-day ascent of a Cascade mountain. The ascent was successful but unexpected delays caused them to reach the trail at dark with several miles to hike to their cars. They stopped to take out their flashlights. Of the 12 climbers 5 did not have flashlights, the batteries or bulb were burned out in 2 flashlights, and one person did not even have any batteries though he did have his flashlight. They started down the trail with 4 workable flashlights. Before long 2 more of the flashlights went out. They finished the hike with 2 flashlights for 12 hikers!

2. A ***map*** is essential to finding one's way in the wilderness. Even a hiker planning to remain on established trails should carry a map that shows the physical terrain around him as well as the trail network. Hikers have been known to be on the right trail but traveling in the wrong direction!

3. The ***compass*** is the primary navigation tool. With a compass, a reliable map, and a little visibility, the hiker can pinpoint his location in the wilderness. A good compass contains a dampened needle, a straight edge on the base for aligning with a map, and a rotating dial for accurate readings.

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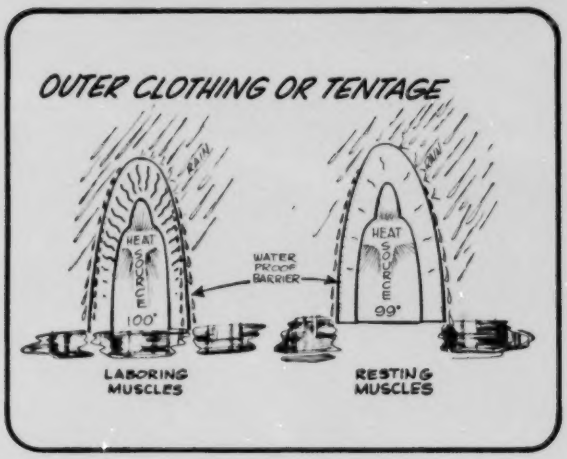
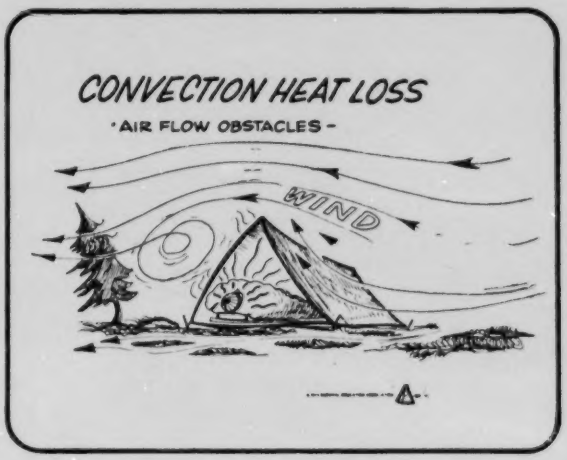
The body does not care what insulates it or shades it. It is something the human must manage with what he has available.

III. The factors affecting *fabric selection* for clothing and equipment are:

A. ***Protection from water*** must take into account both external (rain) and internal (condenses water vapor and perspiration) sources.



OE-56



OE-57

B. ***Wind protection*** is provided by a tightly woven garment.

C. ***Weight*** is not important for short hikes; it is critical for extended trips.

D. ***Durability*** and abrasion resistance are important for outer clothing.

E. The most common fabrics used in outdoor clothing are nylon, cotton, and wool.

Characteristic	Nylon	Cotton	Wool
Water repellancy	Must be coated	Good if tightly woven	Moderate
Chemical resistance	Good	Poor	Poor
Wear resistance	Good	Moderate	Poor
Weight	Lightest	Moderate	Heaviest
Bulk	Least	Moderate	Bulkiest
Insulating qualities -- dry	Poor	Moderate	Excellent
Insulating qualities -- wet	Poor	Poor	Good
Burning qualities	Melts easily	Moderate burning	Slow burning

COMPARISON TABLE OF FABRICS

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B. The ***ventilating layer,*** next to the skin, allows for air circulation to prevent excessive moisture buildup from perspiration.

All management of body protection is accomplished by the outdoorsman, regardless of quality. The improvised cardboard shelter used in an emergency, or the finest clothing available can serve its purpose well. Regardless of clothing quality, misuse, carlessness, or wetness can ruin the effectiveness.

C. The purpose of the ***insulating layer*** is to regulate heat output from the body.

1. Insulation retains heat, it does not create it.
2. The degree of insulation is basically the thickness of the dead (non-moving) air trapped in the clothing. The thickness of insulation required to maintain body heat for various levels of activity are given in the following table.

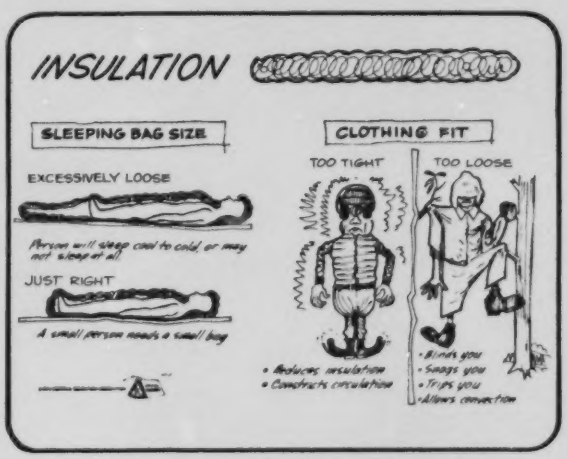
Temperature	Sleeping	Light Work	Heavy Work
40 F.	1.5"	.8"	.20"
20	2.0	1.0	.27
0	2.5	1.3	.35
-20	3.0	1.6	.40
-40	3.5	1.9	.48
-60	4.0	2.1	.52

This table is based on U.S. Army Quartermaster Research data. The temperatures indicated are without wind.

D. The ***protecting layer*** shields the insulating layer from wind and water.

Clothing is essentially the artifical environment we wear. We control the micro layer of warm air next to the skin by insulation or ventilation. Without clothing it would take approximately *2* weeks for our body to rebalance itself for the difference in climate and environments. Then we might be comfortable with less clothing, but not much.

OE-58



OE-59

Exercise: List the items of clothing you are wearing or have in the room with you. Rate each item according to:

- Ventilation
- Insulation
- Sun, wind, rain protection.

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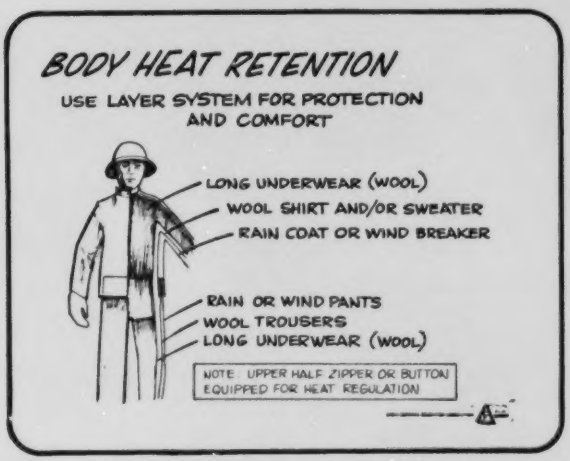
IV. Clothing should be designed around the *layer system.*

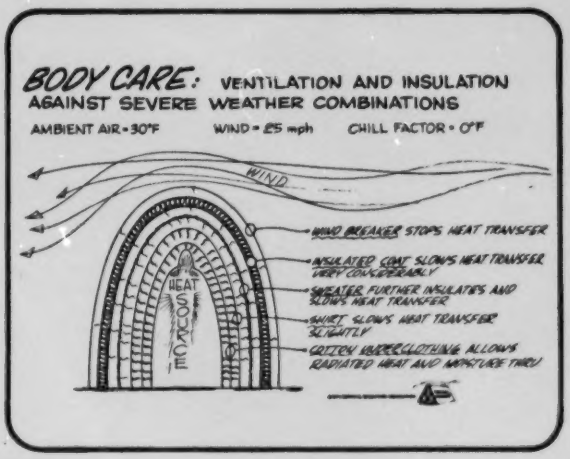
A. Consider: Versatility
Total weight and bulk
Rapid changes in – Temperature
Wind
Exertion

The Indian, Eskimo, and pioneer were physically and mentally acclimatized to raw nature and discomfort. It was part of living in the wild outdoors. Their clothing was multi-purpose. They understood that their clothing was the house they wore.

Because modern outdoorsmen live, work, sleep, play, and travel in controlled artificial environments of 60° to 70°, their bodies require approximately two weeks to adjust to the wild outdoors of less temperate climates. Hence any expected or unexpected travel in cold or hot environments requires special considerations in clothing, insulation, and activities.


BODY HEAT RETENTION
USE LAYER SYSTEM FOR PROTECTION AND COMFORT
LONG UNDERWEAR (WOOL)
WOOL SHIRT AND/OR SWEATER
RAIN COAT OR WIND BREAKER
RAIN OR WIND PANTS
WOOL TROUSERS
LONG UNDERWEAR (WOOL)
NOTE: UPPER HALF ZIPPER OR BUTTON EQUIPPED FOR HEAT REGULATION

OE-60


BODY CARE: VENTILATION AND INSULATION AGAINST SEVERE WEATHER COMBINATIONS
AMBIENT AIR - 30°F
WIND - 25 mph
CHILL FACTOR - 0°F
WIND
WIND BREAKER STOPS HEAT TRANSFER
INSULATED COAT SLOWS HEAT TRANSFER VERY CONSIDERABLY
SWEATER FURTHER INSULATES AND SLOWS HEAT TRANSFER
SHIRT SLOWS HEAT TRANSFER SLIGHTLY
COTTON UNDERCLOTHING ALLOWS RADIATED HEAT AND MOISTURE THRU
HEAT SOURCE

OE-61

Regardless of the quality of clothing, the basic insulating value may be ruined by improper use. Wetness can take away 90% of cotton fabric's insulating potential.

Reminder: **Clothing is so valuable when away from civilization that every precaution must be taken to protect it from wetness, fire, and loss by wind.**

Food For Thought:

What clothing could you quickly grab while exiting a burning house? What clothing would you need to protect your body outside the house in any one of the seasons - fall, winter, spring, summer?

What is your most valuable piece of outer clothing for walking to school each day?

To offset climatic discomfort, moderns need more clothing. To offset their lack of skill and experience they need more safety equipment. Because of this lack of skill and limited free time, modern travelers use artificial aids for navigation, sleeping, and cooking. In fact, modern man attempts to bring his comfort with him in short encounters with Nature.

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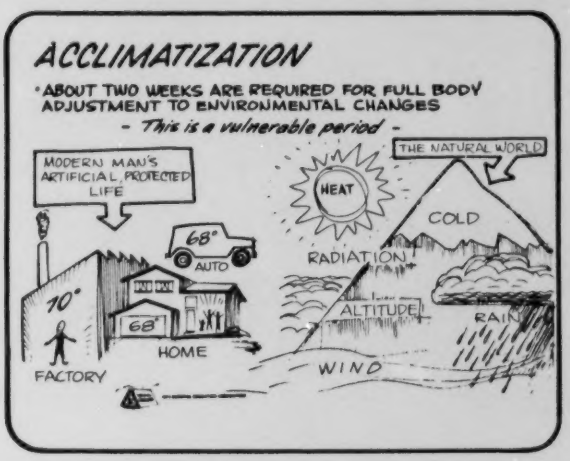
V. Specific clothing needs.

A. General clothing – Temperature control.

Basically, the human body does not care what helps to manage its delicately balanced inner body temperature. With the absence of fur, feathers, or a thick hide, man must provide flexible body protection to enjoy the wide range of temperatures in the outdoors.

The mental enjoyment of clothing ranges from fit to fashion. The physical enjoyment will be based on body protection that easily insulates or ventilates, as needed. Comfort relies upon clothing that does not constrict the vital systems or muscle movement.



OE-62

Clothing, or other Body Shelter
Wet clothing has lost its insulating value.
YOU MUST REGULATE THEM TO PROTECT THE MICROENVIRONMENT THAT GUARDS THE INNER ENVIRONMENT.
DARK COLORS ABSORB SOLAR HEAT, LIGHT COLORS REFLECT IT.
YOUR PROTECTION FROM BODY HEAT LOSS OR GAIN
ONLY YOU CAN REGULATE & PROTECT WHAT YOU WILL WEAR DURING AN UNEXPECTED EMERGENCY.

OE-63

1. A ***hat*** can be used for sun, wind, or rain protection and/or warmth.

   "When your feet are cold put on your hat."

   At 40°F. up to 1/2 of the body's total heat production may be lost through an uncovered head.

2. A ***shirt*** and/or ***sweater*** provide insulation by trapping air within or between themselves.

3. The ***parka*** is primarily for wind and rain protection. For maximum protection it should have a hood with a good face protection and should be large enough to fit over a combination of inner clothing.

4. The fabric and design requirements for ***trousers*** vary with weather and terrain. They should allow for air circulation and freedom of movement. In extreme cold climates they should be warm, windproof, and water repellant. Additional wind and rain protection is provided by wearing nylon wind pants over the hiking trousers.

5. For maximum efficiency ***underwear*** should provide warmth as well as allow for evaporation and circulation of perspiration. Available designs include "long-johns," bonded wool/cotton, and "fishnet."

6. ***Handwear*** provides warmth and abrasion protection. The layer system is best: a shell for wind and water protection and a wool liner for warmth. Mittens are warmer than gloves; gloves provide more dexterity.

7. ***Raingear*** is generally totally waterproof, allowing perspiration and water vapor to condense inside. An option is to hike in light clothing, get wet, change to dry clothing at camp. However, the latter option assumes that the body's heat production is adequate to compensate for increased heat loss.

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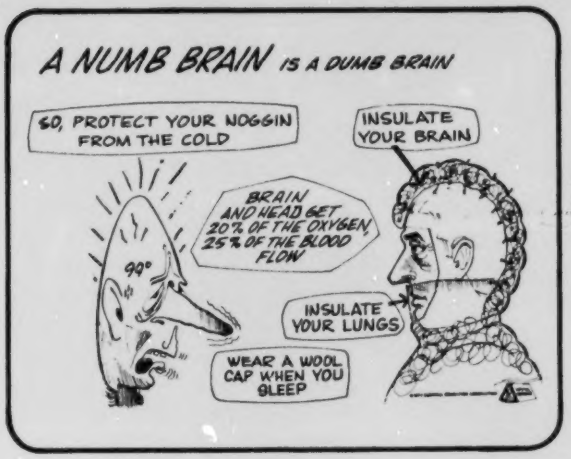
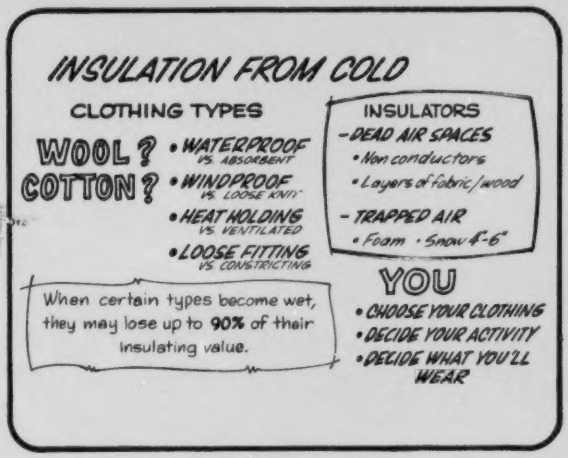

A NUMB BRAIN IS A DUMB BRAIN
SO, PROTECT YOUR NOGGIN FROM THE COLD
INSULATE YOUR BRAIN
90°
BRAIN AND HEAD GET 20% OF THE OXYGEN, 25% OF THE BLOOD FLOW
INSULATE YOUR LUNGS
WEAR A WOOL CAP WHEN YOU SLEEP

OE-64


INSULATION FROM COLD
CLOTHING TYPES
WOOL ?
COTTON ?
• WATERPROOF VS. ABSORBENT
• WINDPROOF VS. LOOSE KNIT
• HEAT HOLDING VS. VENTILATED
• LOOSE FITTING VS. CONSTRICTING
INSULATORS
- DEAD AIR SPACES
• Non conductors
• Layers of fabric / wood
- TRAPPED AIR
• Foam • Snow 4"-6"
When certain types become wet, they may lose up to 90% of their insulating value.
YOU
• CHOOSE YOUR CLOTHING
• DECIDE YOUR ACTIVITY
• DECIDE WHAT YOU'LL WEAR

OE-65

Exercise: Plan clothing requirements for a variety of outdoor activities and weather conditions.

Examples:
Hiking - heavy forest, rainy
Boating (canoe) - sunny, windy
Snowshoeing - very cold, snowing

B. Footwear.

1. ***Boots*** **should be adequate for intended usage. They should give good ankle support and have lug soles. The manufacturer's or supplier's recommendations should be followed on methods and materials for waterproofing.**
2. ***Socks*** **provide warmth, cushioning, and water absorption.**
3. ***Gaiters*** **are basically fabric cylinders that fit around the ankles and over the boot tops creating a seal against snow or sand.**
4. **Other foot gear may be needed for specific sports - Tennis, Boating, Beach, Skiing, Running.**

OE-66

COLD HANDS AND FEET
ARE SAYING
BOOTS ARE TOO TIGHT
BOOTS THAT ARE TOO SMALL DONT ALLOW SPACE FOR INSULATION
WET WOOL STILL RETAINS SOME HEAT. COTTON OR SYNTHETIC SOCKS WICK AWAY BODY HEAT WHEN WET.
WRIST BANDS MAY BE CONSTRICTING BLOOD FLOW
WRONG TYPE OF BOOTS FOR WEATHER CONDITIONS
BOOTS ARE WET
GET UP AND MOVE AROUND A LITTLE
PUT ON MORE LAYERS

OE-67

Humans can go just about anywhere barefooted, in tennis shoes, or any footgear. But comfort and enjoyment quickly erode when your feet hurt. Shoes are modern man's foundation; and when a man's traveling foundation is poor, enjoyment crumbles into the misery of aches and pains. The farther from civilization you travel, the more valuable your legs, feet, and boots become. Often they are your only way of returning.

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Example:

A stranded hunter with a small, rucksack-type pack managed to spend several comfortable nights in the high country by putting his feet in the rucksack at night, using all his extra clothing, plastic bags, and the limbs from small, bare bushes he found in his camp area.

VI. Backpacks.

A. Selection and use of a ***backpack*** are primarily functions of

individual physical characteristics,

intended use.

With careful planning a day-pack may be adequate for a several-day outing while a full-capacity frame backpack may be inadequate for other uses.

Every explorer in history carried some means of patching his body, protecting it, and refueling it.

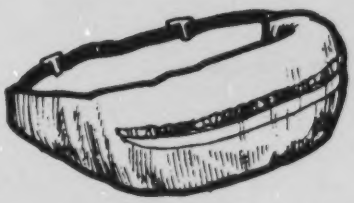
A "possibles" bag, saddle bag, or packsack are a means of carrying your valuable life support items. The more you carry, the more important this outdoor tool becomes.

B. ***Soft Packs*** are backpacks that contain no frame.

1. ***Belt*** and ***waist packs*** are small bags designed to wear as a belt around the waist.

Capacity: 100 to 300 cubic inches
3 to 10 pounds

Uses: Lunches
The Essentials
Cameras
Personal gear



Beltpack

OE-68

2. ***Day packs*** are small packs designed to hang from the shoulders.

Capacity: 700 to 1000 cubic inches
20 to 25 pounds

Uses: General day-hiking equipment
Emergency gear

Options: 1) A waistband helps prevent the pack from shifting on the back.
2) Vertical or horizontal partitions provide more efficient loading and access.
3) For the larger day-packs, semi-rigid aluminum or fiberglass frames in the form of sewn-in stays helps distribute the load between the shoulders and hips.

OE-68

Must fit properly and be adequate to contain the necessities you need to carry to support life during emergencies.

Rucksack

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3. ***Overnight packs*** are a further development and refinement of the day pack to a more comfortable, larger capacity pack.

   Capacity: Up to 5500 cubic inches
   Up to 60 pounds depending on the strength of the user

   Uses: 2 to 3-day trips

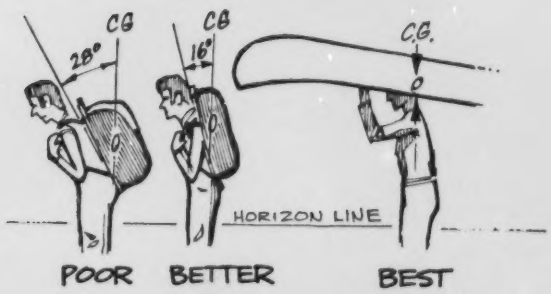
   Characteristics:

   1) The body pack is designed to conform directly to the user's back thus using the user's back for support. The efficiency of this design is a function primarily of the method of packing equipment into the bag.
   2) The internal frame pack provides support for the large bag by the use of adjustable metal or synthetic rods or slats sewn into the bag. A padded waist belt increases comfort and distributes part of the weight to the hips.

4. ***Rigid pack frames*** with fitted bags provide the most comfortable and convenient method of carrying large loads on extended trips.

   Capacity: Up to 6000 cubic inches
   Weight limited only by user's strength

   Uses: Extended trips of several days
   Heavy or bulky loads



HEAVY LOADS ARE BEST CARRIED ON A SPINAL SUPPORT PERPENDICULAR TO THE HORIZON LINE

OE-68

Heavy load pack

Options: 1) Waist or hip suspension systems help distribute weight between hips and shoulders.
2) Most bags have multiple outside pockets that provide convenience in organizing and finding equipment.
3) Bags may be a single compartment or may be divided into various arrays of zippered compartments.
4) Some bags are waterproof; others provide optional waterproof covering.

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C. Pack a soft pack for comfort with soft items near the back (your back!). Avoid overloading either by weight or bulk.

D. Pack frame/bag with heavy items high and near the back, least needed items at the bottom, frequently used items in outside pockets.

E. Waterproof all items individually in plastic bags. Although most pack fabrics are "waterproof," water can enter the pack through unproofed seams or when it is opened. Blowing sand or snow can be forced right through zippers.

Carrying or storing your essentials for quick use:

In an emergency, grab outer clothing and any handy items of clothing, tools, food. Roll other items in the outer garment and hand carry or sling over your shoulder.

Going boating or canoeing:

Carry your essentials in a waterproof bag.

Going auto touring:

Old clothing and walking shoes in a plastic bag, along with food and liquids, old sleeping bag, should be placed in trunk. Such emergency items make delays more comfortable.

VII. Optional equipment can provide an extra safety margin and/or increase general enjoyment of an outing.

A. A ***repair kit*** consisting of wire, pliers, needle and thread, etc. is handy for minor emergencies – torn clothing, broken pack parts, malfunctioning stove, etc.

B. ***Fishing gear*** can provide extra food aswell as the enjoyment of fishing and is considered by many to be an Essential. Be aware of local fishing regulations.

C. ***Camera equipment*** can provide a visual record of an outing.

D. ***Reference books*** (birds, trees, flowers, mammals, edible plants, . . .), if not too heavy or bulky, can add interest to an outing.

VIII. ***Improvisation*** can reduce costs and increase versatility of available equipment.

A. Worn wool slacks make good wool hiking pants.

B. Knapsack and stuff bags can be lashed to a packframe, eliminating the need for a packbag.

C. Light plastic tarps are cheap sources of shelter. Remember – Pack it out!

D. Look for multiple uses for each piece of equipment carried.

Examples:

Candle – Illumination, firestarter
Socks – Footwear, emergency handwear
Plastic bags (large) – Litter, emergency shelter, ground cloth, water protection for other equipment.

TRAIL ESSENTIALS ?
• THE PACK AND THE TWO LEGGED MULE (YOU)
SIZE OF PACK SACK AND LOAD MUST BE EQUAL TO CONDITIONS OF THE JOURNEY AND COMPATIBLE WITH THE MULE.
HIS HOUSE AND HOME
BOUGHT PACK TOO BIG; MUST FILL IT. WILL SOON CAMP WITHIN SIGHT OF CAR.
TOO LITTLE FOR TOO FAR, BUT HE'LL "LIVE OFF THE LAND" AND OTHERS
JUST ENOUGH FOR SELF-RELIANCE

OE-69

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COOKING AND EATING

OBJECTIVE: To introduce the types and sources of available foods suitable for hiking, backpacking, and other outdoor activities. Introduction to cooking techniques and equipment.

DESIRED UNDERSTANDING:

1. Food selection factors.
2. Food planning.
3. Importance of water for body cooling.
4. The sources of cooking heat.
5. The equipment and techniques required for cooking food.
6. The basic techniques of sanitation.

NECESSITIES OF HUMAN LIFE

Air, Shelter, Water, Warmth, Energy, Rest

Food energy is the outdoorsman's go power and heat power. Water is his coolant. Both are absolutely necessary for sustained body functions anywhere.

Whether you plan an outdoor activity or have it forced upon you by an unexpected emergency, the human body needs food energy and water. This food and water input must offset energy/coolant output or the body will suffer a deficit. A minor deficit will affect efficiency and enjoyment.

It is well known you can survive a long time without food, but you probably will not enjoy the privation. Hunger, thirst, fatigue, or hypohydration quickly create misery, muscular depletion and mental inefficiencies.

Nothing deters enjoyment quicker than fatigue and thirst. When the body's physical requirements are upset, the mental aspects of enjoyment turn to acquiring the inner body's needs. Often the beautiful sunset is wasted in the headlong flight to satisfy the body's need for food and water.

The food energy and water within your body will take you so far so fast. The faster you use them, the more you need.

I. ***Food selection*** factors:

A. The importance of ***weight*** increases with the length of the trip. Canned foods are acceptable for an overnight trip but become prohibitively heavy for an extended trip. Consideration must be given to the weight of the food packaging, stove, fuel, pots, cooking utensils, accessory foods (spices), etc.

B. ***Palatability,*** individual likes and dislikes, should influence food selection. Some individuals are particularly susceptible to certain foods, for example, grainy foods can aggravate stomach or digestive disorders.

C. ***Energy output*** (caloric content) is important to proper nutrition.

D. Food ***preparation time*** must be considered in the overall time schedule. The time spent cooking and eating should be based on individual desires. The complexity of preparation and amount of cooking equipment required will affect the overall weight considerations. Pre-cooking, e.g., fresh meat, can reduce preparation time significantly.

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E. ***Cost*** is a major consideration for many hikers. Supermarket shopping can reduce cost well below that of expensive hiking specialty foods (freeze-dried).

F. On a short trip pre-cooked or non-cooking food can reduce weight by eliminating the need for a stove, fuel, and cooking utensils.

II. *Food planning.*

EXERCISE: Prepare menus and food lists for an arbitrary activity before studying this section.

A. ***Prepare menus*** for the entire trip. Short trips required little planning or preparation. Planning becomes more critical for longer trips. Menus should be based on the above selection factors. See Page 91

B. Assemble ***shopping lists*** from the menus. Calculate the total quantity requirements for each food item. A complete shopping list can provide a tool for obtaining quantity discounts, especially if some items can be purchased in case-lot quantities.

C. The method of producing the final food product affects both weight and price.

Many foods are ***naturally light*** and convenient for hiking -- noodles, soup mixes.

Dehydrated foods - some foods, especially fruits, are ***naturally dried to*** reduce weight and spoilage but cost is increased.

The ***freeze-drying*** process involves flash freezing the food, then subjecting it to radiant heat in a vacuum. Foods submitted to this process retain much of their flavor and nutrients but are costly.

D. ***Supermarkets*** should be investigated as a source of lightweight, less expensive food. Available foods include noodle-base dishes, dehydrated potatoes, rice, dried fruits, powdered milk, and even gravy and sour cream mixes that weigh less than an ounce.

EXERCISE: Compile a list of appropriate foods available from a supermarket.

E. ***Package*** food by meals, and by days for longer trips. Repackage boxed items into plastic bags to reduce weight and bulk. Be sure to include the preparation instructions. Although more costly it is sometimes easier to include small (1/2 ounce) packets of salt, pepper and sugar with each meal rather than carry larger containers of each.

EXERCISE: Revise initial menus and food lists taking into account the above factors. This is also a good time to study nutrition; calculate calories, and protein, carbohydrate, fat content.

To modern Americans food is often a pacifier, not really needed for their minimal activity. But outdoorsmen can burn enormous amounts of energy in muscle movement and heat production and perspire quarts of body coolants during their strenuous activities.

Thoughtful conservation of what you have by slowing down the activity, changing routes, or clothing management means you can go further on less.

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III. Water for cooling the body and cooking food may not be readily available.

A. Plan to leave home with a surplus of water and salt within your body. (Water can be ineffective during a salt deficiency.)

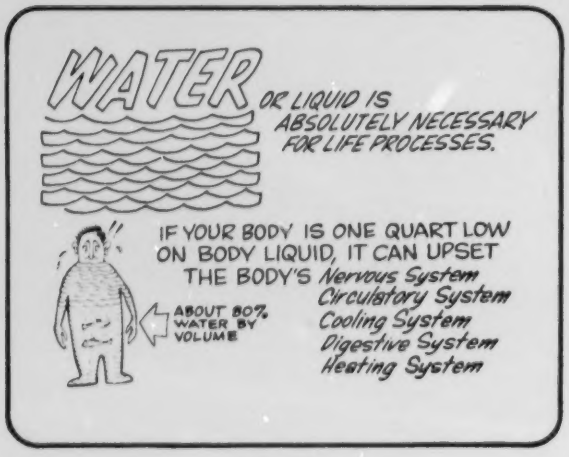
B. Plan to carry water from home in an unbreakable container rather than expect the spring or creek to be flowing.

C. Pure water can be a problem. Always carry iodine, or water purification tablets. Boiling takes time, fuel and a boiling container.

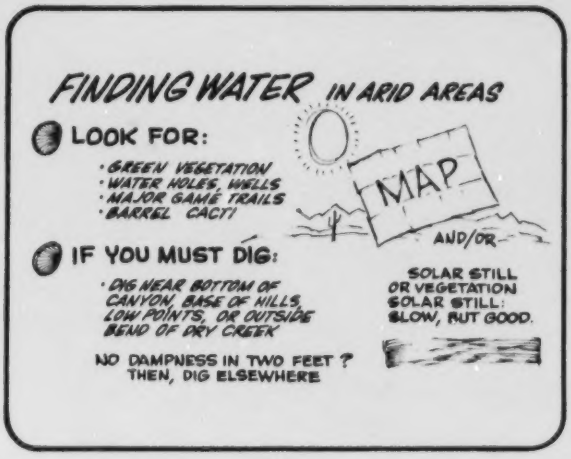
D. Melting snow or ice for water, always put a small amount of water in the pot to facilitate the melt process.

E. Digging for water in arid areas is often not worth the effort. More water loss in digging than is gained from the well or solar still.

F. The water requirements of the body are well established. A 2% deficiency can cause a 25% loss of brain and muscle efficiency. Self management of water intake and water losses becomes more important as the heat gain increases. Perspiration is the body's automatic cooling system. When it flows coolant upon the skin it also releases vital body chemicals that are necessary for the entire body to function.


WATER
OR LIQUID IS ABSOLUTELY NECESSARY FOR LIFE PROCESSES.
IF YOUR BODY IS ONE QUART LOW ON BODY LIQUID, IT CAN UPSET THE BODY'S
Nervous System
Circulatory System
Cooling System
Digestive System
Heating System
ABOUT 80% WATER BY VOLUME

OE-70


FINDING WATER IN ARID AREAS
LOOK FOR:
· GREEN VEGETATION
· WATER HOLES, WELLS
· MAJOR GAME TRAILS
· BARREL CACTI
MAP
AND/OR
IF YOU MUST DIG:
· DIG NEAR BOTTOM OF CANYON, BASE OF HILLS, LOW POINTS, OR OUTSIDE BEND OF DRY CREEK
NO DAMPNESS IN TWO FEET ? THEN, DIG ELSEWHERE
SOLAR STILL OR VEGETATION SOLAR STILL: SLOW, BUT GOOD.

OE-71

G. In extreme dry heat conditions perspiration can evaporate so quickly that it gives no visible sign indicating water loss.

H. In extreme humid heat conditions perspiration cannot evaporate, forcing the use of alternative methods of cooling the body and possibly abandoning all physical activities until temperature and humidity change.

I. Salt deficiencies due to heavy perspiration can create a chemical upset within the body. Starting the activity with a surplus of salt is advisable. Resupply with small amounts taken with water. Salt management is an individual responsibility. The amount within the body must be determined from your past 24 hour intake.

The human body is a much better heater than a refrigerator. The primary response to heat gain is to flow body water upon the skin for evaporation cooling. Water is one of the inner body's most limited supplies and must be a priority item in planning warm weather or extreme cold weather activities.

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IV. Equipment for Cooking and Eating.

A. Cooking utensil requirements are a function of the complexity of the meals.

B. Pot grippers are a must for handling hot pots.

C. Communal eating out of the cooking pot saves dirty dishes.

D Plastic utensils hold heat longer than metal, are easier to clean, and the cup rim will not burn lips when drinking hot liquids.

E. Minimum silverware is a spoon. A knife is already provided in the Essentials.

V. Cooking techniques.

A. Plan ahead to keep cooking instructions as simple as possible. Pre-measure and pre-mix combination meals, for example, cereal-dry milk-sugar mix makes a fast and efficient breakfast when added to boiling water.

B. If necessary, eat each course of a multi-course meal as it is prepared to avoid eating part of the meal cold.

C. Allow for greatly increased cooking times at higher altitudes. At 8000 feet cooking time is double that at sea level.

VI. Sanitation.

A. The basic rule for garbage disposal is: ***PACK IT IN, PACK IT OUT.*** Burn only combustible refuse and only where it is safe and regulations do not prohibit open fires. Carry out all unburnables including unburned materials left in the campfire ashes. Never bury garbage or leave plastic behind.

B. ***Dish and waste water*** should be disposed of around the edges of a campfire if there is one. Otherwise dispose of waste water away from vegetation, streams, and lakes. Use biodegradable soaps; detergents are harmful to vegetation.

Allow time, supplies, and water for adequate cleaning and rinsing of all cooking and eating utensils.

C. ***Toilets*** should be used when provided. If not, a latrine should be dug 6 to 8 inches deep, at least 150 feet from lakes or streams and at least 50 feet from any campsite. A layer of dirt is shoveled in after each use and the sod is replaced when camp is broken.

VII. Heat sources.

Fire is one of man's greatest tools. When controlled it can provide heat, light and comfort. Uncontrolled it can destroy everything in its path.

A. A ***wood fire,*** the traditional cooking heat source, depends on the availability of wood and the ability of the firemaker. A wood fire also provides warmth and eliminates the weight of a stove and fuel. However, wood fires are rapidly approaching the category of FOR EMERGENCY USE ONLY. Reasons for this are:

Firewood sources are being depleted by overuse of some areas.

Natural wood fires are prohibited in many wilderness areas.

***Sunshine** is the most often overlooked and under used source of heat for drying clothing, warming the body and melting snow for water.*

OE-72

LOCATION OF A FIRE
NEVER build a fire under a snow laden tree.
NEVER build a fire on or near rocks that are porous or have been in the water.
BOOM
NEVER build a fire directly on the snow.
ALWAYS clear a good fire circle down to mineral earth to keep fire away from forest.
MINERAL EARTH

OE-73

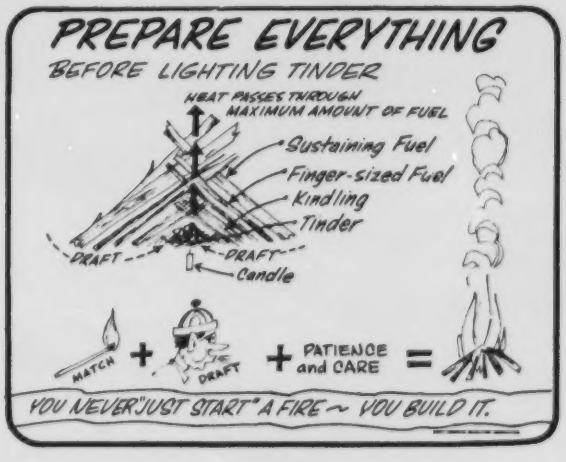
The *basic rules of fire usage* are:

1. **Check on the local fire regulations before departing on a trip. Natural wood fires are no longer allowed in many wilderness areas, except in cases of emergency.**
2. **Use existing fireplaces. Don't create unnecessary new fire scars.**
3. **Use down and dead wood only. Conserve the available wood.**
4. **Lay the fire only on mineral soil.**
5. **Never leave a fire unattended.**
6. **Be sure the fire is out when leaving. If the ashes are too hot to touch, the fire is not out. (water it, stir it, rewater it, feel it).**

(all petroleum stoves have inherent dangers and dangerous exhaust fumes learn to use them properly).

FIRES MUST BE CONTROLLED AND PUT OUT
• SOAK IT THOROUGHLY
• SMOTHER IT WITH EARTH
• TEST FOR PERSISTING HEAT WITH YOUR HANDS
-CAUTION-
POROUS FIRE CIRCLE ROCKS WILL EXPLODE!
BOOM

OE-74



OE-75

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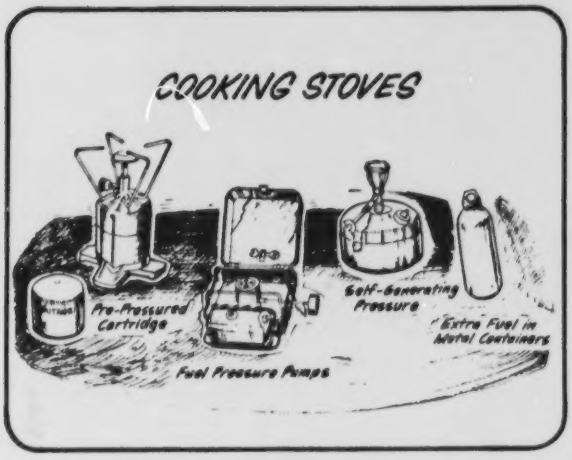
The basic ***principles of firebuilding*** are:

1. Be aware of the above rules for fire usage.
2. Combustion requires fuel, heat, and oxygen. A fire cannot burn without all three.
3. Gather the necessary supply of wood before starting the fire. Look for dry wood under large logs, in the center of old stumps, or the twigs sheltered under the lower branches of a tree. Standing dead wood is generally dry inside.
4. The initial heat source may be friction heat, an electric spark, the sun's rays (magnified), a match, a lighter, or a metal-flint "firestick." This heat source is shortlived.
5. The firestarter or tinder is easily ignited by the initial heat source and provides a more sustained flame to ignite the firewood.
6. The firewood, in order of ignition, should be small shavings, then small sticks (kindling), and finally larger, longer-lasting pieces of wood.
7. Keep the fire small.

B. A ***chemical fire*** (Sterno, Heat Tabs, Canned Heat) has a restricted heat output and is heavy for the amount of heat produced. It is adequate for heating a cup of tea or soup on the trail but inadequate for cooking a full meal.

C. ***Alcohol stoves*** are simple to operate, lightweight, and easy starting. However, they have relatively low heat output and the fuel may be hard to purchase.

D. Other ***liquid fuel stoves*** usually burn white gasoline or kerosene. Some burn either. They have a high and controllable heat output but require priming to start and the fuels require special precautions in handling. *



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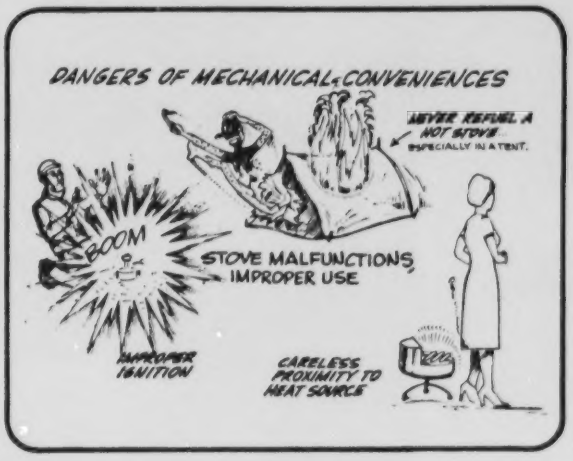
DANGERS OF MECHANICAL CONVENIENCES
NEVER REFUEL A HOT STOVE ESPECIALLY IN A TENT.
BOOM
STOVE MALFUNCTIONS IMPROPER USE
IMPROPER IGNITION
CARELESS PROXIMITY TO HEAT SOURCE

OE-77

White gasoline is widely used and generally available but is extremely volatile. This is especially dangerous when fumes are allowed to collect in an enclosed space, e.g., when refuelling a stove in a tent.

Coleman Fuel, or similar liquid fuels, can be used in stoves that burn white gasoline. It is less volatile and tends to burn cleaner with less stove clogging problems. It is generally more available than white gasoline.

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Kerosene **is much less volatile than either of the above. However, it requires a separate priming fuel, usually alcohol, it is smelly, and it burns with a dirty, sooty residue if the stove is not in top condition.**

* *In extreme cold precautions must be taken to avoid spilling any liquid fuel on the skin. Even in extreme cold the fuel does not freeze and is at the outside air temperature. This extreme cold combined with the evaporative cooling effect can cause instant frostbite.*

E. ***Gas cartridge stoves*** **use sealed canisters that contain either butane or propane under pressure. The heat output is directly dependent on the pressure in the cartridge; it drops with a drop in temperature and with use. Although these are most expensive fuels per unit of heat, they offer extreme convenience requiring no priming and a simple valve operation.**

Vaporization pressures below which the fuel is a liquid, therefore will not vaporize, or burn:

Butane	**10° F**
Propane	**-45° F**

Thus propane is more efficient at temperatures well below freezing but is heavier because it is packaged under higher pressures, which requires a stronger (and heavier) container.

A modern convenience camping stove, like any other mechanical device, can malfunction. Often this happens at a very inappropriate time. The stove's chief enemy is the wind and man's impatience. Usually the stove did work or was working properly. Analyze the problem and possible causes before pouring on more fuel to preheat the generator.

Always carry the recommended tools and repair kit for your particular stove. Generally your pretrip preventative maintenance and use of the proper fuels will help to reduce those camp cooking frustrations.

More about liquid fueled camp stoves:

Many land management agencies do not allow open cooking fires in their forested areas. Cooking stoves are required if you wish to visit their back country areas. They are essential for overnight snow trips and are a great asset in preventing or treating body cold problems where hot liquids are necessary.

In reality, liquid fueled stoves are quicker to light, faster to cook, safer, cleaner and more ecologically acceptable. Rescue teams have them as required field equipment. But probably the reason open fires are being discouraged is because not all outdoorsmen know how to manage an open fire. More often they have not learned how to extinguish their fires and have desecrated millions of acres of recreational lands. Purchase a reliable stove and use it properly. Such stoves have saved several lives by quickly producing the hot water necessary to revive a hypothermic buddy. One wonders about how many animals were saved because of the forest fires that could have happened from careless open fires.

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THOUGHTS ABOUT FOOD TO CARRY

ENERGY FOODS FOR SHORT TRIPS (one day).

Since all foods contribute to the energy pool, a one-day outing into the back country does not require much concern about what food is best. Take along whatever you like to eat that is easy to carry, eat and prepare.

If the activity is strenuous, select foods that are easily digested. The more nutritious the better. Your working muscles will get first priority from the bloodsupply. Any hard-to-digest foods or large amounts of food will cause a conflict between the muscles and the digestive demands for blood priorities.

Best results are obtained from small amounts of easily assimilated nibble foods eaten frequently during the activity. Many outdoorsmen carry nibble foods in their pocket. Candies, dried fruits, nuts, cookies or whatever suits your taste. Stay with the carbohydrates because they quickly produce usable energy for the activity. Strenuous activities can burn well over 5000 calories during the day.

Wherever you go that takes you away from normal resupply outlets (stores, restaurants, kitchens, etc.), put a little food fuel in your pocket or purse.

Just a little something to tide you over those unexpected delays that linger through your normal lunch or supper hours.

FOOD THOUGHTS FOR LONGER TRIPS (over night).

Jim Mitchell, who loves to eat well in the backcountry, truly enjoys a feast at his high camp. He has been known to carry fresh steaks, salads and all the trimmings to satisfy this desire. Since Jim is involved in climbing expeditions, outdoor equipment sales and teaches climbing courses, he is continually testing and evaluating new products. So it is not uncommon to enjoy a gourmet feast at his camp.

Other strong climbers have been known to carry fresh potatoes to bake and melons for dessert. Whatever you want to carry in and carry out that is reasonable to satisfy the hunger pangs of exercise.

What you really need is food fuel that will be quickly assimilated into muscle fuel. That means carbohydrates to provide the enormous calorie count used in strenuous exercise. Climbers often burn in excess of 5000 calories per day. Appropriate menus to accomplish these values are too numerous and controversial to be included in this guide. We suggest you refer to the charts, caloric food values, and menus listed in the following recommended books. Then make up menus you prefer to eat.

Backcountry Cookery, *by Ruth Mendenhall,* La Siesta Press, Glendale, 1968.
Food for Knapsackers, *Sierra Club,* San Francisco, 1971.
Freedom of the Hills, *The Mountaineers,* Seattle, 1974.

SLEEPING AND SHELTER

OBJECTIVE: To familiarize the student with proper camping techniques, shelter, and sleeping equipment.

DESIRED UNDERSTANDING:

1. The factors involved in campsite selection.
2. The types of shelter available.
3. The requirements and characteristics of sleeping equipment.
4. How to sleep warm in the wilderness.

Sleeping, like oxygen, is something we are addicted to. We must have it regularly or we will get it automatically. Outdoor sleeping can be made enjoyable and relaxing - or miserable. It depends upon your equipment and how you use it.

I. Campsite selection factors.

A. ***Water*** must be considered from the standpoint of

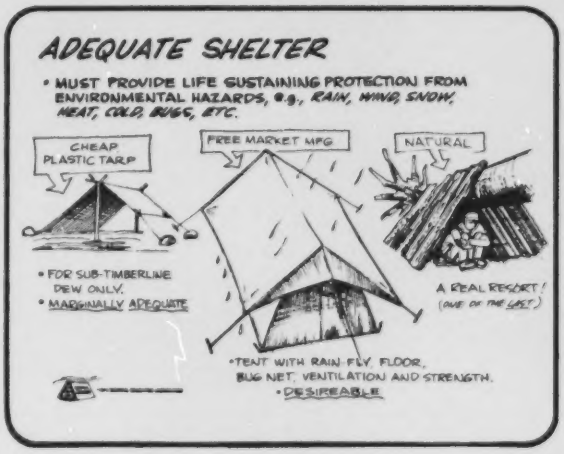
1) availability for drinking and cooking,

2) the need for protection from rain or running water.

A depression is a likely place for rain water to collect. River levels can fluctuate at odd hours because of the time lag involved with daytime melting of snow far upstream.

CAMP SITE SELECTION NEEDS:
• DRINKING WATER SOURCE
• WIND PROTECTION
• SAFE FROM AVALANCH, FLOOD, FALLING SNAGS, ETC
~Remember~
• Meadows are very fragile
• Camp in designated spot
• Camp away from trail if possible
~Finally~
• Leave no trace of your visit
• Leave established camp spot better than you found it

OE-78


ADEQUATE SHELTER
• MUST PROVIDE LIFE SUSTAINING PROTECTION FROM ENVIRONMENTAL HAZARDS, e.g., RAIN, WIND, SNOW, HEAT, COLD, BUGS, ETC.
CHEAP PLASTIC TARP
FREE MARKET MFG
NATURAL
• FOR SUB-TIMBERLINE DEW ONLY.
• MARGINALLY ADEQUATE
A REAL RESORT! (ONE OF THE LAST)
•TENT WITH RAIN FLY, FLOOR, BUG NET, VENTILATION AND STRENGTH.
•DESIREABLE

OE-79

One party of climbers in Alaska camped on a sand bar near a glacial stream. In the middle of the night they found themselves afloat in their tent. They had not considered the time lag involved in the afternoon's snow melt high on the glacier, which reached them many hours later.

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B. ***Wind protection*** **is essential for comfort. Not only does the wind rob body heat but cooking becomes a chore as most stoves do not have adequate built-in windscreens. And a wood fire in the wind is a nuisance at best, easily becoming a general fire hazard.**

Shelter is anything that protects the body from whatever is harming it. However a sleeping shelter or place to rest in the wild outdoors takes time, effort and generally some equipment. During severe weather storms body protection can become the priority necessity. Bugs, insects, wind, rain, heat and cold are a few other discomforts that challenge man's ability to improvise a defense. Adequate shelters take time to find a spot; time to build or erect and time to make it comfortable. Always allow 2 to 3 hours before darkness to make your traveling home.

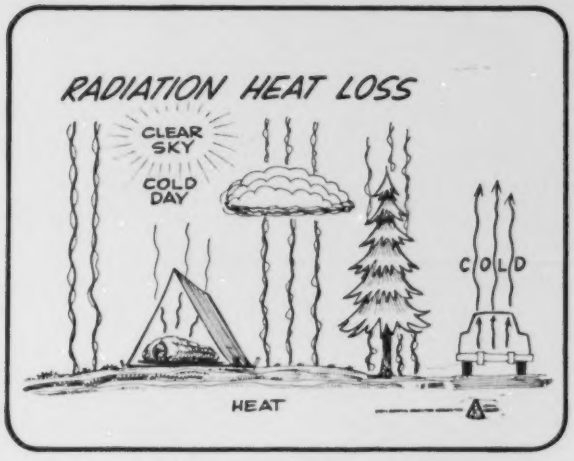
C. ***Safety*** **considerations include potential flash floods or rock or snow avalanches. A child's natural affinity for water can be disastrous around lakes and streams.**

D. **A supply of wood is essential if a wood fire is to be used for cooking.**

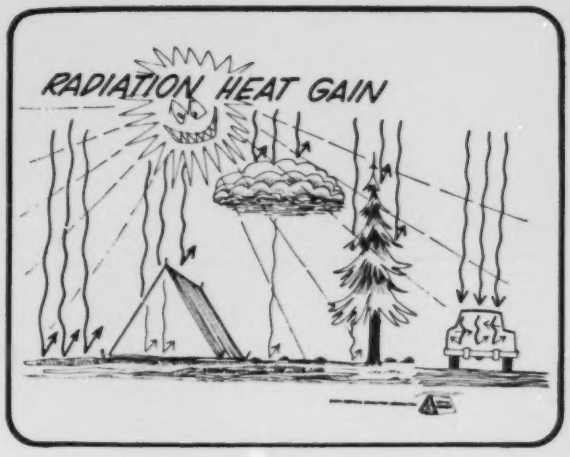
E. **The *scenery* and natural beauty of a campsite may be the dominant influence at the expense of some of the above factors.**

II. Shelter must provide protection from environmental hazards or discomforts.

A. **For maximum efficiency shelter location must take into account *radiation heat* gain in daytime and loss at night.**



OE-80



OE-81

Radiation heat flow is slowed by clouds, trees or other opaque objects.

It takes muscle movement to produce heat. Whether you sit on the exposed ridge and shiver, or move your feet slowly to a better place to wait out the storm, it costs about the same amount of energy. But one way you are still exposed to the cold and far from the friendly forest.

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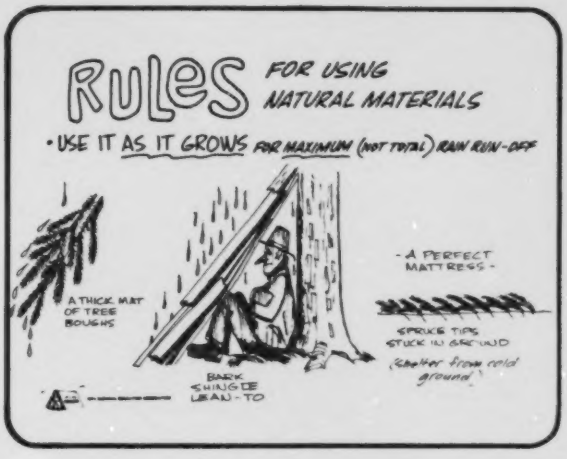
B. The use of ***natural shelter*** reduces the weight required to carry a tent or tarp.

1. Rock overhangs, caves, and even large boulders can provide a secure shelter. The configuration of the "roof" should be checked to make sure water will not seep in and drip on the camp area.
2. Dense trees can provide wind shelter and some protection from a light rain. However, once the branches are soaked through, water continues to drip long after the rain has stopped. Snow-covered branches provide a secure winter shelter, but beware of falling clumps of snow if the temperature goes up.

OE-82


Rules FOR USING NATURAL MATERIALS
• USE IT AS IT GROWS FOR MAXIMUM (NOT TOTAL) RAIN RUN-OFF
A THICK MAT OF TREE BOUGHS
- A PERFECT MATTRESS -
SPRUCE TIPS STUCK IN GROUND (Shelter from cold ground)
BARK SHINGLE LEAN-TO

OE- 83

In an emergency bivouac, use everything you have to help insulate you from the ground and wind. Many outdoorsmen have perished because they did not see any insulation value in their ropes, packs and other equipment they had with them.

3. Snow is a natural shelter building material. A snowcave or trench can be dug with a minimum of equipment to provide wind protection. Snow blocks provide the material to construct a snow house shelter.

OE-84

FIRE BUILDING TIPS - 4
FIRE SUPPLEMENTS BODY'S HEAT PRODUCING MECHANISM
Several small fires around a person heat better than a single large fire and use less fuel.
Bury the coals and sleep on them. (WITH CARE!)
TECHNIQUES FOR BARREN AREAS WITH FEW NATURAL SHELTER CAPABILITIES.

OE-85

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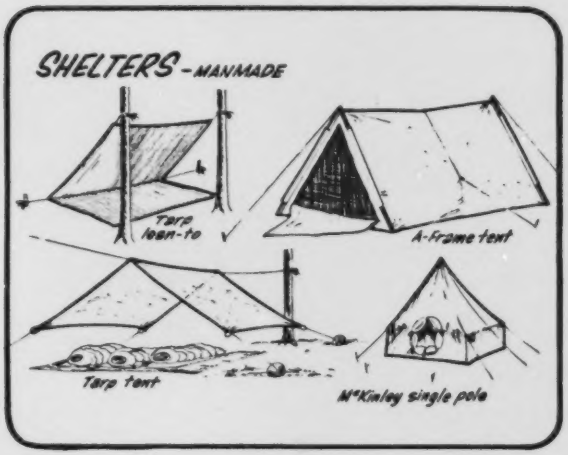
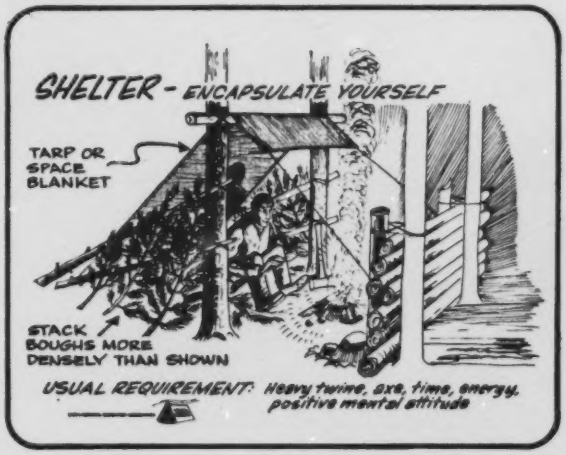
C. ***Tarps*** are lightweight and versatile. Those made from coated nylon with a number of ties allow a variety of ways to rig a shelter. Plastic tarps are inexpensive but are less durable and there is a tendency to leave torn plastic behind. Pitched properly, tarps can provide considerable water and wind protection. The biggest disadvantage: No insect protection.

Your tent is your multipurpose tool for protection against many discomforts: insects, flies, wind, rain, cold, heat or sun. During a major storm in barren places they are invaluable.



OE-86


SHELTER - ENCAPSULATE YOURSELF
TARP OR SPACE BLANKET
STACK BOUGHS MORE DENSELY THAN SHOWN
USUAL REQUIREMENT: Heavy twine, axe, time, energy, positive mental attitude

OE-87

D. ***Tents*** are generally heavier than tarps and relatively expensive but provide the maximum in security. The features to be considered in ***selecting a tent*** are:

1. In most applications ***warmth*** is a secondary consideration. However, where it is important (snow camping) warmth is a function of size, fabric, and design. Given the same design, a smaller tent will be warmer than a large one. A double-walled tent will be warmer because of the insulation value of the air space enclosed between the walls.
2. ***Water repellency*** is provided either by using a waterproof tent fabric or a waterproof rainfly over a non-coated nylon tent. The waterproof fabric will not allow water vapor from breathing and insensible perspiration to pass through; the vapor condenses on the walls. In cold weather the condensation freezes on the tent walls and "snows" on the occupants when the walls are touched or moved by the wind. The tent-rainfly combination is versatile and provides an insulation layer to reduce inside condensation and increase warmth. The disadvantage of this combination is the total weight involved.
3. ***Weight*** is a function of fabric, size, and pole design. As much as 50% of a tent's weight can be concentrated in the pole system. Total weight must consider the basic tent, rainfly, poles, pegs, guy lines and carrying sack.
4. ***Size*** is usually determined by personal preference, based on the intended use of the tent. Backpacking tents are frequently tapered both in length and height and have a simple pole system, all to reduce weight. At the other extreme, mountaineering expedition tents are generally much larger to allow for more comfortable living and gear storage during extended stormy periods.

5. One of the primary functions of a tent is ***insect protection.*** Most tents have a layer of mesh fabric sewn over the inside of each tent opening to provide insect protection while allowing for ventilation by tying back the main flaps of the tent.
6. Considerations for tent ***fabric*** include water repellency, breathability, wear resistance, weight, and wind resistance. The primary tent fabrics, cotton and nylon are compared in Table on page 41. The most popular fabric is ripstop, or a similar weave nylon, with a eurethane or polymer coated nylon rainfly.
7. ***Pole design*** is a function of basic tent design. Some smaller tents are designed to use a packframe or tree for support. Others use a single pole in the center or at the ends. A more stable A-frame design utilizes two poles at each end. The most complex design uses a system of exterior poles to which the tent is attached. However, the more complex the system the heavier the weight and the more dependent is the system on each piece of the frame; the loss of one piece renders the whole frame useless. Single-piece poles are lighter than comparable multi-piece poles.

Throughout history outdoor explorers carried some means of sleeping warm. At first they used furs and skins, and then wool blankets, and now they use specially designed and filled cloth bags. Each kind served its purpose. Whatever was used, it kept the user at accustomed comfort level and acclimatization.

III. Sleeping bag selection.

A. Full consideration must be given to the ***intended usage*** of a sleeping bag.
   1. What type of camping will the bag be use for -- backpacking, car camping, horsepacking, mountaineering?
   2. In what seasons will the bag be used?
   3. What are the general warmth characteristics of the individual who will use the bag?

Review the principles of body heat production and heat loss.

B. The ***insulating material*** affects the cost, warmth, weight, and construction methods.
   1. Early arctic explorers used sleeping bags sewn out of wool blankets or animal skins, usually wolf, caribou, or sheep.
   2. The early American explorer and/or cowboy used wool blanket roll.
   3. The standard sleeping bag became a heavy rectangular wool or kapok-line bag.
   4. World War II introduced the government surplus down-filled, mummy-shaped sleeping bag on the market at a reasonable price.

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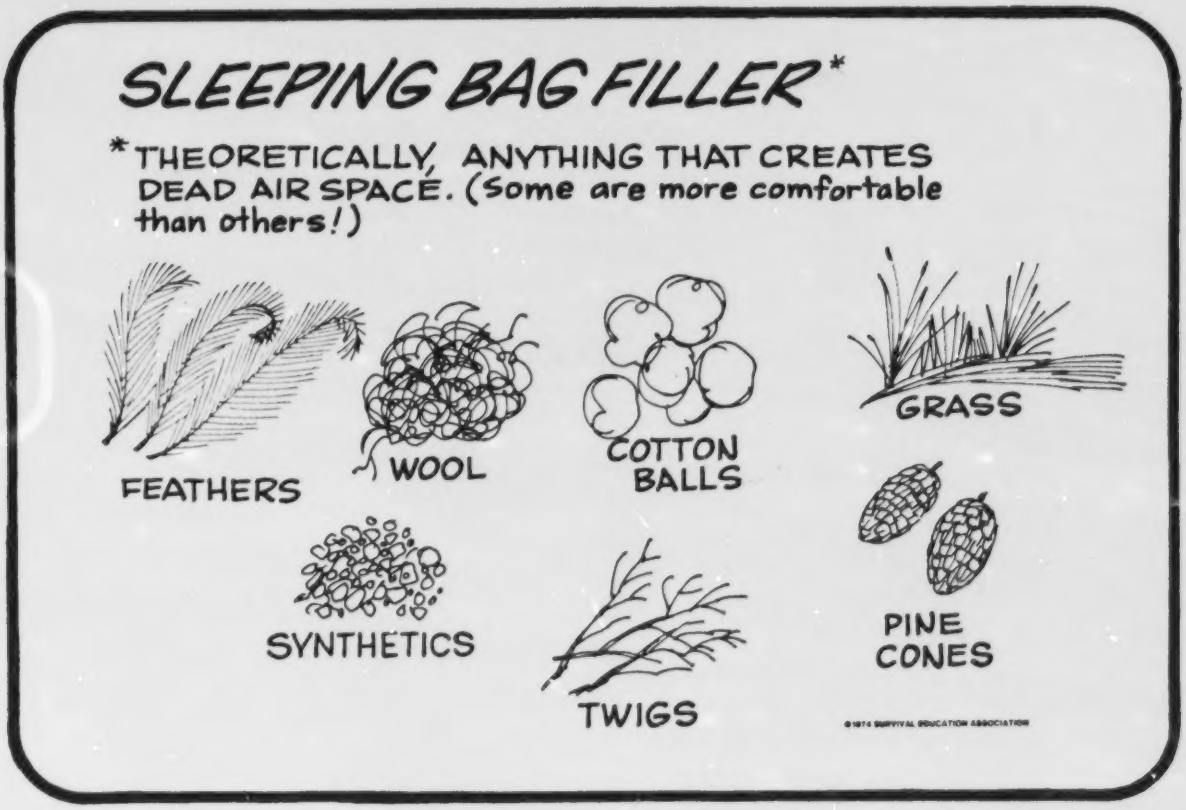


OE-88

5. ***Down*** is the fine insulating material found under the feathers of ducks and geese. Its natural function as an insulator has made it the standard insulating material for lightweight sleeping bags. The primary reasons for its popularity are its light weight and compressibility for a given amount of insulation. Down is also soft, odorless, non-toxic, breathable, and resilient. On the negative side down is expensive and loses its insulation when wet. Down bags require particular care in use and cleaning.

6. ***Polyesters*** are synthetic fibers used as insulation in less expensive sleeping bags. Polyester has less loft than down, is heavier, and more bulky. Polyester fibers are water resistant, retain some loft even when wet. Polyester is inexpensive.

7. An ***advanced polyester,*** Fiberfill II, is a silicone-coated spun Dacron. It is non-allergenic, odorless, completely machine washable and dryable, and compresses better than the above polyesters. It is 80% to 90% as compressible as down and has about 70% of the loft of an equal weight of down. Its big advantage over down is it ability to retain virtually all of its loft (insulating value) when wet. Other trademarks for similar advanced polyesters Kodel and Polarguard.

8. ***Foam*** insulated sleeping bags simply utilize two sheets of nylon-covered polyurethane foam. Foam is breathable, non-allergenic, resilient, naturally cushioning, completely washable, and retains most of its warmth when wet. It is comparable to the advanced polyesters in weight, bulk, and cost.

Comparison of Insulation Materials for Given Level of Warmth

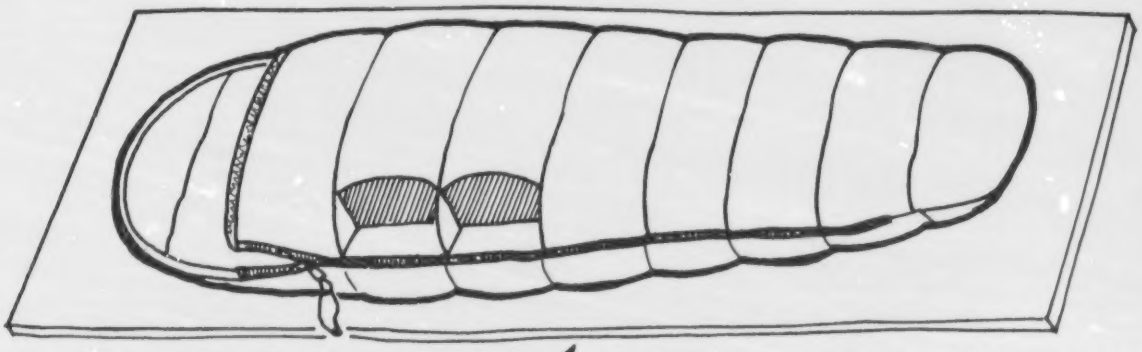
	Warmth	Lightest Weight	Simplicity of Construction Methods	Lowest Cost	Least Bulk
Wool	Same Level	6	2	2	6
Kapok		5	2	1	5
Polyester		4	3	1	4
Polyester II		2	4	3	2
Foam		3	1	4	3
Down		1	5	5	1

C. Sleeping bags are compared generally by the quality of construction, the loft, and the effective temperature range.

1. ***Quality*** of construction is determined primarily by the reputation of the manufacturer. A reputable manufacturer will stand behind his products.
2. ***Loft*** is generally used to specify the total thickness of a sleeping bag after it has had time to fluff up to its full thickness. Some manufacturers use it to specify the thickness of one wall. The criteria for determining loft should be determined for each manufacturer before a comparison is made. The thickness of the actual insulating layer can then be determined.
3. Most manufacturers indicate an ***effective temperature range*** for each model sleeping bag. Most do not state how they arrive at the rating. The temperature rating can be used to compare different models of a given manufacturer but must be combined with loft and other considerations when comparing models of different manufacturers.

D. Sleeping bag ***shapes and sizes.***

1. The ***rectangular*** bag is the roomiest. It is generally the least expensive construction but is heavy and its roominess creates superfluous air space to heat. There is usually no top closure.
2. The ***mummy*** bag is the other extreme. Contoured to the body shape, it is the lightest, warmest, and most efficient design. Mummy bags have a hood closure and the foot area is usually enlarged for comfort.
3. The ***wedge shape*** is actually a tapered rectangle, with or without a hood.
4. The ***modified mummy*** is barrel-shaped, largest at the midsection.



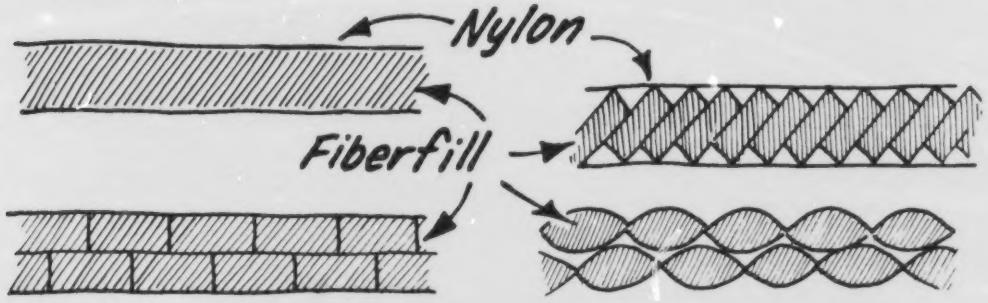
Closed Cell Foam Pad →

OE-89

See OE 59 Page 42 for bag size.

F. ***Construction*** methods.

1. The basic principle is to create a ***uniform loft*** throughout the bag to eliminate thin or cold spots.
2. ***Fiberfill*** is produced in battings and is sewn into sleeping bags in sheets, with some variations.



OE-89 Fiberfill Construction Methods

3. ***Down*** is subject to matting and shifting so a method of baffling is necessary to control the down filling to create a uniform loft.

a. Quilted (Sewn-Through)

OE-90

Method: Two layers of flat fabric are sewn together. The resulting tubes are filled with down.

Advantages: Cheapest construction, light weight.

Disadvantages: Stitching creates cold spots at the seams.

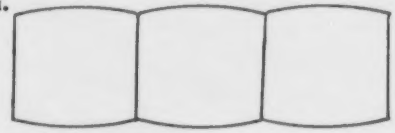
b. Modified Quilted

OE-90

Method: A layer of fabric is attached on one side of the quilted layer.

Advantages: Relatively cheap, more warmth than quilted, especially from additional wind protection.

Disadvantages: Additional layer of fabric increases weight with only a small increase in warmth.



OE-90

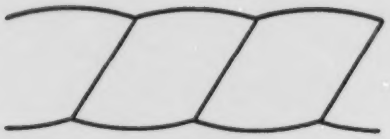
c. Box (Baffle Box, Square Box)

Method: A series of vertical baffles are sewn between two shells to prevent longitudinal shifting of the down.

Advantages: Comparatively light weight for increased warmth.

Disadvantages: The size of the boxes allows some down shift, creating possible cold spots.

d. Slant Box (Offset Box)



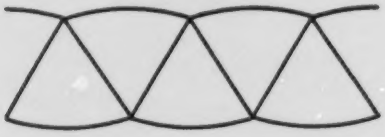
OE-90

Method: The baffles are offset to form a slant-walled box.

Advantages: There is less down shift than with the square-box construction. Warmer.

Disadvantages: More fabric, thus more weight.

e. Overlapping "V" (Overlapping "V" Tube)



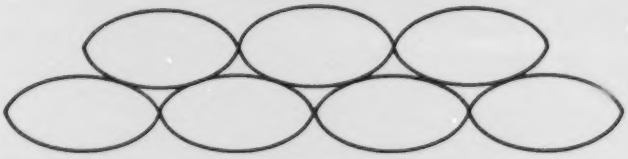
OE-90

Method: The baffles are sewn up and down between the outer layer of fabric to create a series of overlapping V's.

Advantages: This is the strongest baffling construction. It is the most efficient for retaining a uniform down distribution, thus, is the warmest.

Disadvantages: Heaviest because of additional baffling material required. Lofting can be restricted if not correctly constructed.

f. Double Quilted



OE-90

Method: Two layers of quilted down are placed together with an offset to give uniform loft and eliminate cold spots.

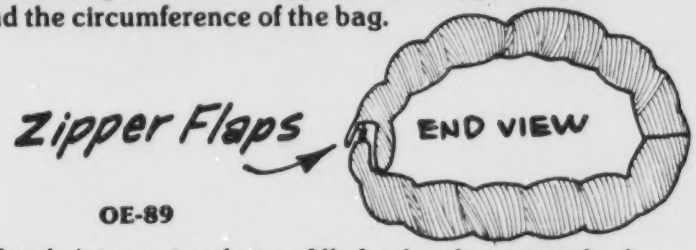
Advantages: Warmest type of construction.

Disadvantages: The extra layers of fabric create a heavier and bulkier bag. Lofting is somewhat restricted by the amount of quilting.

Regardless of the quality of clothing, the basic insulating value may be ruined by improper use. Wetness can take away 90% of cotton fabric's insulating potential.

Reminder: Clothing is so valuable when away from civilization that every precaution must be taken to protect it from wetness, fire, and loss by wind.

4. The ***channel block*** (side-block baffle) is a longitudinal baffle in down bags that extends the length of the bag on the side opposite the zipper to prevent down from shifting around the circumference of the bag.



OE-89

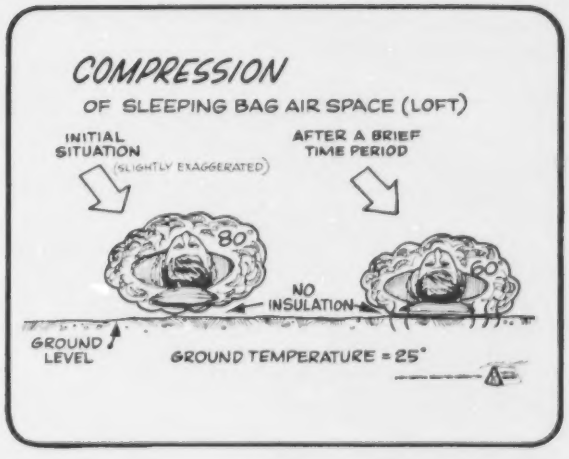
5. The ***zipper baffle*** (draft tube) is an insulation-filled tube that extends the length of the bag on the inside of the zipper. Its purpose is to prevent heat loss through the zipper.
6. ***Differential cut*** is a method of construction in which the inner circumference is constructed smaller than the outer shell. Known as the "thermos bottle principle," the theory is that cold spots created by movement of the sleeper are eliminated, for example, a knee or elbow pushing against the inside of the bag. This construction also allows for a certain amount of circulation and is used by most manufacturers.
7. The use of heavy duty nylon or non-corrosive Delrin ***zippers*** has eliminated much of the problems encountered with earlier metal zippers – snagging, breakage, freezing and the danger of skin-to-metal contact in extreme cold.

   The full-length zipper is most popular and versatile, especially if it has a double tab to allow it to be opened from either end for ventilation.
8. The ***shells*** of nearly all sleeping bags are now made of nylon; it is strong, breathable, wind resistant, down proof, and lightweight.

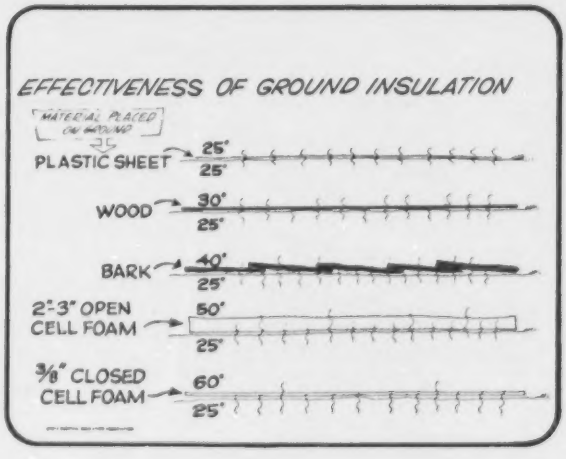
   Taffetta nylon is a flat weave fabric with a softer, more comfortable texture and a higher thread count than ripstop nylon.

   Ripstop nylon has the same strength as taffeta but has extra heavy threads every 3/16" to 1/4" which prevent tears from running. This feature makes ripstop more durable than taffeta.

   Cotton shells are still used in some rectangular bags where weight is not important.



OE-91



OE-92

Whatever the insulation materials in the sleeping bag, it must have something under it to insulate it from conduction heat loss to the colder or warmer ground.

IV. Sleeping Pads.

A. Body weight compresses the insulation in the bottom layer of the sleeping bag thus requiring more insulation to maintain warmth.

B. Ideally insulating pads should be ***lightweight, soft, compact, waterproof,*** and an ***efficient insulator.***

C. The traditional ***air mattress*** is relatively heavy, presents a possible leakage problem and is least efficient of the common sleeping pads due primarily to heat loss from convection currents set up in the mattress by the movements of the sleeper.

An improvement on the traditional air mattress is to partially fill the tubes with down (a messy process) to reduce convection heat loss.

A recent inovation utilizes a set of separately-sealed tubes, eliminating the problem of air flow between tubes.

D. ***Urethane foam*** is soft and provides good insulation when dry. It is an open-cell structure and will absorb water. Thus a waterproof cover is generally used.

Eurethane foam is lighter than an air mattress but is bulkier.

E. ***Ensolite*** or ***polyethylene*** is a closed-cell structure. It does not absorb water. It is more compact and lighter than foam although it does not provide as much padding.

	Weight	Thickness	Water Absorption	Padding
Air mattress	High	3" -4"	None	Good
Foam	Moderate	1" - 4"	High	Good
Ensolite	Low	1/4" - 1/2"	None	Moderate

COMPARISON TABLE OF GROUND PADS

F. Ground insulation can be ***improvised*** from clothing, backpacks, climbing equipment, boat cushions, etc.

EXERCISE: Given a survival situation, construct a list of possible insulating materials that are likely to be available.

G. ***Tree boughs — NO! — Emergency use only!***

One of life's priorities is rest. You allow for it or it comes naturally. Adequate rest every day is essential for maintaining tomorrow's efficiency during the activity.

VIII. Sleeping warm.

A. Understand the principles of body ***heat production*** and ***heat loss.***

1. The body produces heat at a rate to maintain a body core temperature of 99° F.
2. While sleeping, heat production is reduced by 20%.
3. The primary sources of body heat are food and muscular activity.

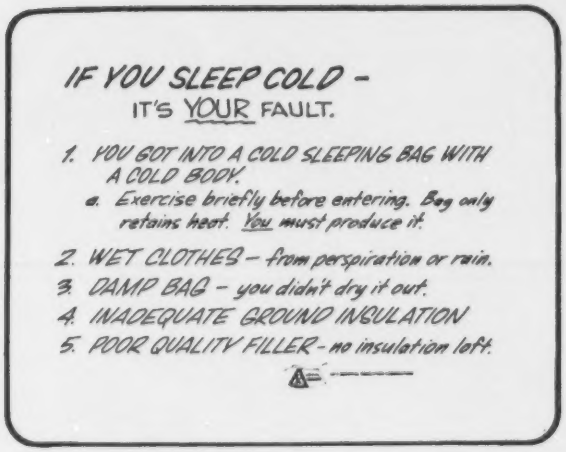
B. Understand the principles of ***insulation.***

1. The most efficient natural insulation is ***non-moving air.***
2. Insulation (clothing, sleeping bag) ***slows the body's heat loss*** but ***does not stop heat flow*** and ***does not create heat.*** The more efficient the insulation the slower the heat flow.

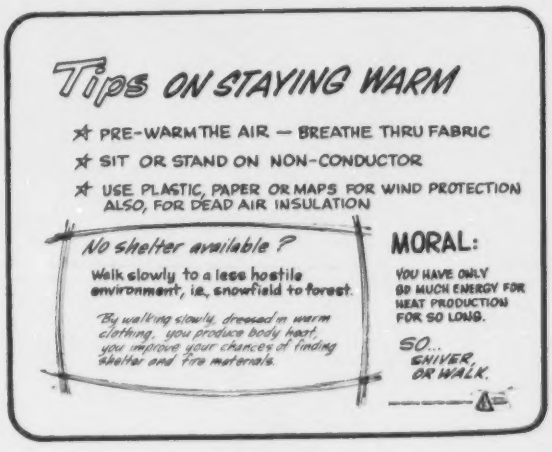
C. To sleep warm body heat output must be sufficient to ***replace heat loss.***

1. Heat ***output*** can be ***increased*** by:
   a. Drinking or eating ***hot liquids or foods*** has the fastest warming effect on the body.
   b. Any form of ***exercise*** or muscle tension increases heat output.
2. Heat ***loss*** can be ***decreased*** by:
   a. Using more efficient insulation.
   b. Adding more insulating layers.
3. ***Total heat loss*** and or insulation must be considered from the body outward to the cosmos – clothing, airspace inside the sleeping bag, thickness of the sleeping bag, tent or other shelter, tent rainfly, tree cover, sky cover (clouds, clear).

Review the principles of body heat production and heat loss.


IF YOU SLEEP COLD –
IT'S YOUR FAULT.
1. YOU GOT INTO A COLD SLEEPING BAG WITH A COLD BODY.
a. Exercise briefly before entering. Bag only retains heat. You must produce it.
2. WET CLOTHES – from perspiration or rain.
3. DAMP BAG – you didn't dry it out.
4. INADEQUATE GROUND INSULATION
5. POOR QUALITY FILLER – no insulation loft.

OE-93


Tips ON STAYING WARM
☆ PRE-WARM THE AIR — BREATHE THRU FABRIC
☆ SIT OR STAND ON NON-CONDUCTOR
☆ USE PLASTIC, PAPER OR MAPS FOR WIND PROTECTION ALSO, FOR DEAD AIR INSULATION
No shelter available ?
Walk slowly to a less hostile environment, ie., snowfield to forest.
By walking slowly, dressed in warm clothing, you produce body heat, you improve your chances of finding shelter and fire materials.
MORAL:
YOU HAVE ONLY SO MUCH ENERGY FOR HEAT PRODUCTION FOR SO LONG.
SO... SHIVER, OR WALK.

OE-94

If your sleeping bag is too large or too long, fold the excess underneath the body. A small body with small extremities cannot warm up an oversized bag. Too small is better than too large in cold extremes.

BEST COPY AVAILABLE

EMERGENCY RESPONSE

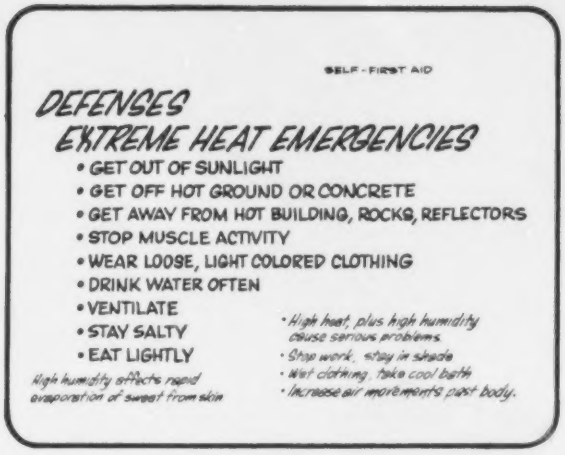
OBJECTIVE: To familiarize the student with the temporary responses necessary to to cope with the body threats from COLD, HEAT, AND INJURY.

DESIRED UNDERSTANDING:

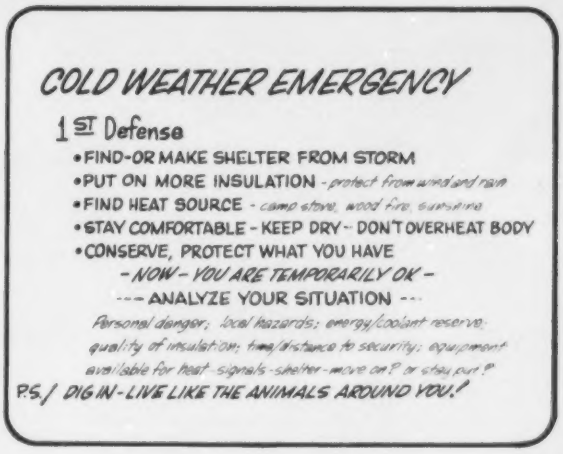
1. Factors involved in coping with adverse weather.
2. Temporary requirements to cope with body injury.
3. How to cope with environmental discomforts.
4. How to treat cold injuries.
5. The cause and treatment of hypohydration.

A. WEATHER EXTREMES.

1. General guidelines for protecting life during weather changes.


SELF - FIRST AID
DEFENSES
EXTREME HEAT EMERGENCIES
• GET OUT OF SUNLIGHT
• GET OFF HOT GROUND OR CONCRETE
• GET AWAY FROM HOT BUILDING, ROCKS, REFLECTORS
• STOP MUSCLE ACTIVITY
• WEAR LOOSE, LIGHT COLORED CLOTHING
• DRINK WATER OFTEN
• VENTILATE
• STAY SALTY
• EAT LIGHTLY
High humidity affects rapid evaporation of sweat from skin
• High heat, plus high humidity cause serious problems.
• Stop work, stay in shade
• Wet clothing, take cool bath
• Increase air movements past body.

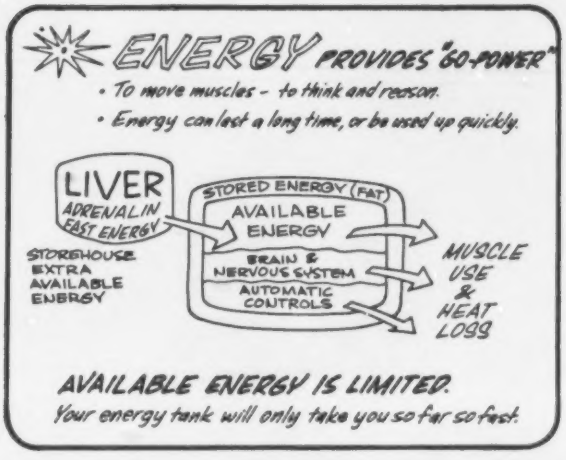
OE-95


COLD WEATHER EMERGENCY
1ST Defense
• FIND-OR MAKE SHELTER FROM STORM
• PUT ON MORE INSULATION - protect from wind and rain
• FIND HEAT SOURCE - camp stove, wood fire, sunshine
• STAY COMFORTABLE - KEEP DRY - DON'T OVERHEAT BODY
• CONSERVE, PROTECT WHAT YOU HAVE
- NOW - YOU ARE TEMPORARILY OK -
--- ANALYZE YOUR SITUATION ---
Personal danger; local hazards; energy/coolant reserve; quality of insulation; time/distance to security; equipment available for heat-signals-shelter-move on? or stay put?
P.S./ DIG IN - LIVE LIKE THE ANIMALS AROUND YOU!

OE-96

B. BODY MANAGEMENT DURING UNEXPECTED EMERGENCIES.

1. Understanding the need to conserve energy.
2. Providing maximum body protection.



OE-97

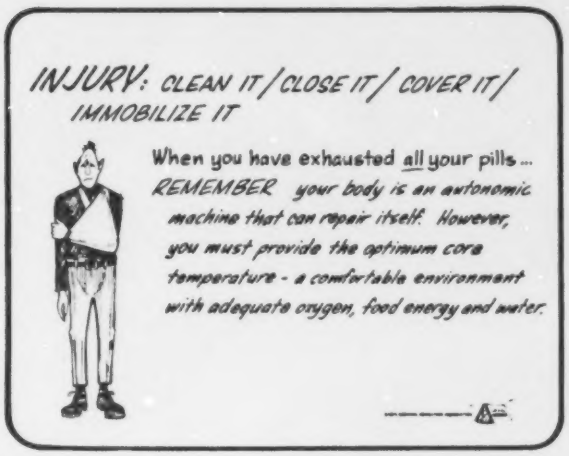
POOR CLOTHING
REQUIRES IMPROVISED SHELTER
POOR CLOTHING PLUS POOR SHELTER
REQUIRES A HEAT SOURCE (FIRE)
(OR AMPLE FOOD FUEL AND WATER FOR CONTINUOUS SHIVERING TO PRODUCE BODY HEAT.

OE-98

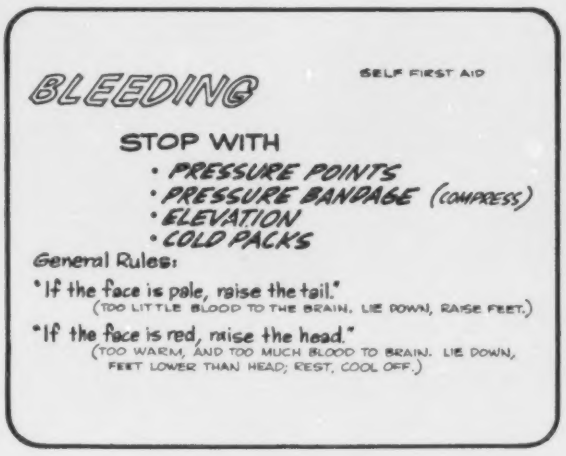
BEST COPY AVAILABLE

Thoughtful conservation of what you have by slowing down the activity, means you can go farther on less.

C. Body injury and temporary treatment of body injuries.

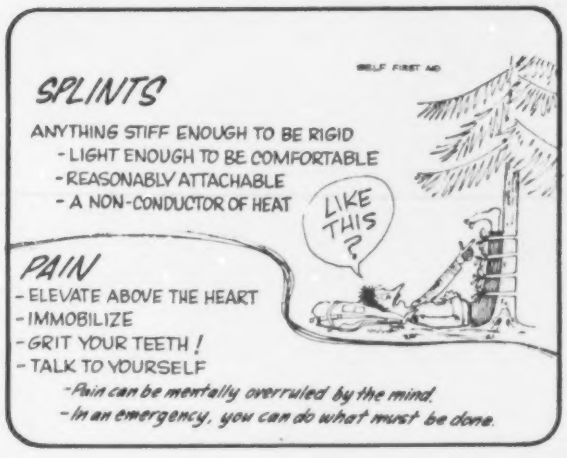

INJURY: CLEAN IT / CLOSE IT / COVER IT / IMMOBILIZE IT
When you have exhausted all your pills ...
REMEMBER your body is an autonomic machine that can repair itself. However, you must provide the optimum core temperature - a comfortable environment with adequate oxygen, food energy and water.

OE-99

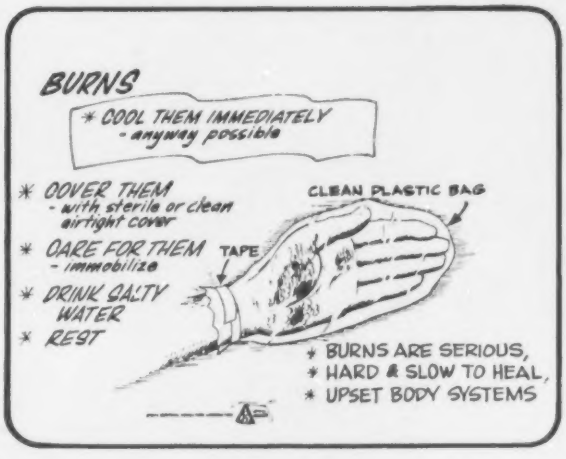

BLEEDING
SELF FIRST AID
STOP WITH
• PRESSURE POINTS
• PRESSURE BANDAGE (COMPRESS)
• ELEVATION
• COLD PACKS
General Rules:
"If the face is pale, raise the tail."
(TOO LITTLE BLOOD TO THE BRAIN. LIE DOWN, RAISE FEET.)
"If the face is red, raise the head."
(TOO WARM, AND TOO MUCH BLOOD TO BRAIN. LIE DOWN, FEET LOWER THAN HEAD; REST, COOL OFF.)

OE-100

It has always been recommended that anyone traveling away from quick, professional medical assistance acquire training in Red Cross First Aid. The farther you travel into the wild outdoors the more knowledge about medical sufficiency you will need. Special Mountaineering first aid or Advanced Red Cross training is available in most of the larger cities.


SELF FIRST AID
SPLINTS
ANYTHING STIFF ENOUGH TO BE RIGID
- LIGHT ENOUGH TO BE COMFORTABLE
- REASONABLY ATTACHABLE
- A NON-CONDUCTOR OF HEAT
LIKE THIS ?
PAIN
- ELEVATE ABOVE THE HEART
- IMMOBILIZE
- GRIT YOUR TEETH !
- TALK TO YOURSELF
- Pain can be mentally overruled by the mind.
- In an emergency, you can do what must be done.

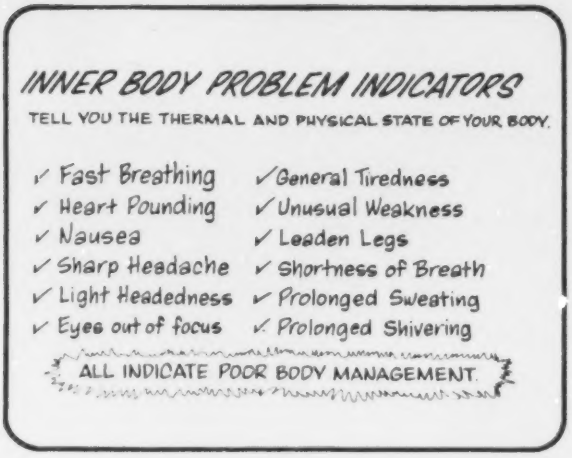
OE-101


BURNS
* COOL THEM IMMEDIATELY - anyway possible
* COVER THEM - with sterile or clean airtight cover
* CARE FOR THEM - immobilize
* DRINK SALTY WATER
* REST
CLEAN PLASTIC BAG
TAPE
* BURNS ARE SERIOUS,
* HARD & SLOW TO HEAL,
* UPSET BODY SYSTEMS

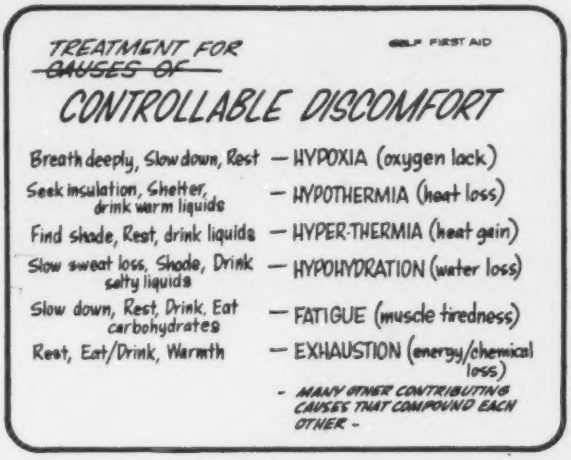
OE-102

BEST COPY AVAILABLE

D. Body problem indicators forewarn of impending discomforts.
   1. Most outdoor discomforts are self-inflicted. The major danger is caused by a general deterioration of mental and physical capabilities.

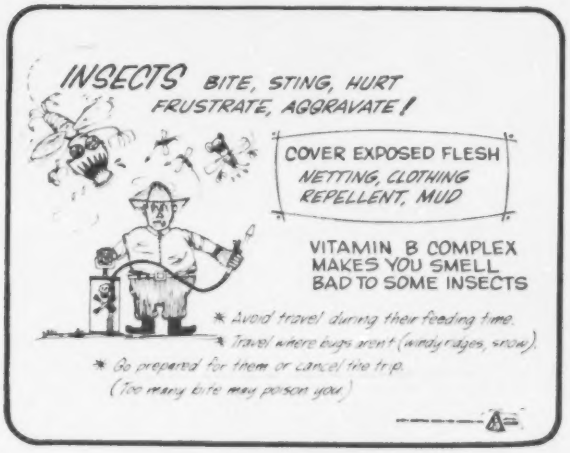


OE-103

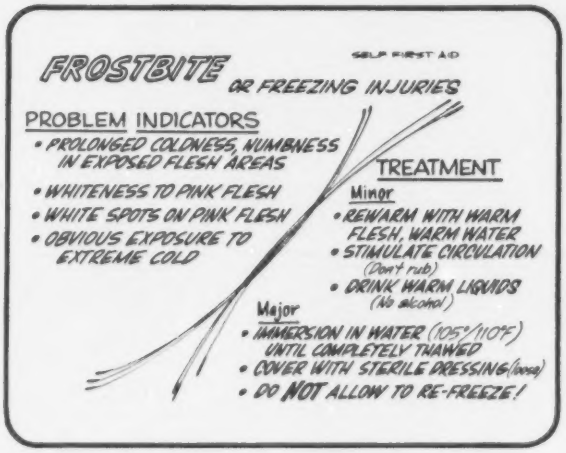

TREATMENT FOR
CAUSES OF
SELF FIRST AID
CONTROLLABLE DISCOMFORT
Breath deeply, Slow down, Rest — HYPOXIA (oxygen lack)
Seek insulation, Shelter, drink warm liquids — HYPOTHERMIA (heat loss)
Find shade, Rest, drink liquids — HYPER-THERMIA (heat gain)
Slow sweat loss, Shade, Drink salty liquids — HYPOHYDRATION (water loss)
Slow down, Rest, Drink, Eat carbohydrates — FATIGUE (muscle tiredness)
Rest, Eat/Drink, Warmth — EXHAUSTION (energy/chemical loss)
- MANY OTHER CONTRIBUTING CAUSES THAT COMPOUND EACH OTHER -

OE-104

E. Environmental considerations must include insects, snakes, and other poisonous creatures that live in the outdoors.


INSECTS BITE, STING, HURT
FRUSTRATE, AGGRAVATE!
COVER EXPOSED FLESH
NETTING, CLOTHING
REPELLENT, MUD
VITAMIN B COMPLEX
MAKES YOU SMELL
BAD TO SOME INSECTS
* Avoid travel during their feeding time.
* Travel where bugs aren't (windy ridges, snow).
* Go prepared for them or cancel the trip.
(Too many bite may poison you)

OE-105


SELF FIRST AID
FROSTBITE OR FREEZING INJURIES
PROBLEM INDICATORS
• PROLONGED COLDNESS, NUMBNESS IN EXPOSED FLESH AREAS
• WHITENESS TO PINK FLESH
• WHITE SPOTS ON PINK FLESH
• OBVIOUS EXPOSURE TO EXTREME COLD
TREATMENT
Minor
• REWARM WITH WARM FLESH, WARM WATER
• STIMULATE CIRCULATION (Don't rub)
• DRINK WARM LIQUIDS (No alcohol)
Major
• IMMERSION IN WATER (105°/110°F) UNTIL COMPLETELY THAWED
• COVER WITH STERILE DRESSING (loose)
• DO NOT ALLOW TO RE-FREEZE!

OE-106

F. Cold injuries are caused by mismanagement of personal insulation. Treatment is time consuming, but absolutely necessary to prevent further loss of tissue and limbs.

Example: Experience shows that carelessness and mismanagement can render even the finest equipment useless. Mind and body deterioration can make even the most brilliant and competent unable to function.

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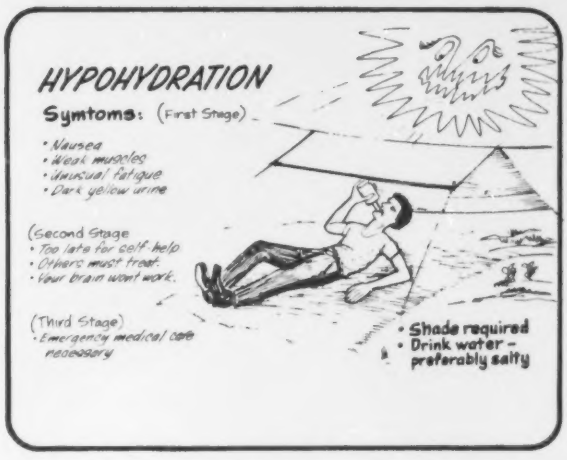
Whenever you perspire you lose water which must be replaced or you get caught in the vicious circle of dehydration symptoms.

Water deficiency causes a headache, and nausea. You don't drink what you need because you think your stomach nausea will increase, which further increases the headache and nausea.

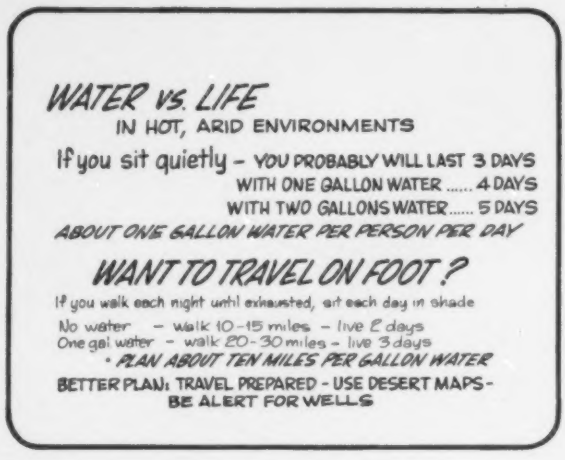
K. Dehydration or Hypohydration is one of the most insidious and miserable of the self-inflicted discomforts.

1. **Thirst desires often are overruled by the pleasure of the activity or the fear of increasing the stomach discomforts.**
2. **The body does not care where it derives the needed liquid coolant. (Water, fruits, vegetables, canned or natural.) The best way is to think ahead and plan to have water available.**
3. **In hot, arid activities it is advisable to carry canned foods, rather than dehydrated foods that require reconstitution before using. Carry water for the food or in the food - it all weighs the same.**

Many humans take pills for the headache and pills for the stomach nausea with no results - no results from such treatment indicate you may have a salt water deficiency or hypo hydration.



OE-107


WATER VS. LIFE
IN HOT, ARID ENVIRONMENTS
If you sit quietly - YOU PROBABLY WILL LAST 3 DAYS
WITH ONE GALLON WATER ..... 4 DAYS
WITH TWO GALLONS WATER..... 5 DAYS
ABOUT ONE GALLON WATER PER PERSON PER DAY
WANT TO TRAVEL ON FOOT ?
If you walk each night until exhausted, sit each day in shade
No water - walk 10-15 miles - live 2 days
One gal water - walk 20-30 miles - live 3 days
• PLAN ABOUT TEN MILES PER GALLON WATER
BETTER PLAN: TRAVEL PREPARED - USE DESERT MAPS - BE ALERT FOR WELLS

OE-108

REST MAY CURE SELF-INFLICTED DISCOMFORTS
* LIE DOWN, RELAX 30 MINUTES.
* ALLOW INNER BODY TO RE-BALANCE.
* COMFORT IS NECESSARY.
THESE RESULT FROM CIRCULATORY UPSET:
HYPOXIA ..... TO LITTLE OXYGEN IN TISSUES
HYPOTHERMIA ..... TOO MUCH BLOOD IN THE BODY CORE
HYPOHYDRATION ..... BLOOD IS TOO THICK
EXHAUSTION ..... NO ENERGY IN BLOOD
HYPERTHERMIA ..... TOO LITTLE BLOOD IN BODY CORE
FATIGUE ..... EXCESS WASTE MATTER IN BLOOD

OE 109

The digestive system shuts down in response to the stress of a traumatic injury situation. Use caution with all medications. Rest allows the body to rebalance itself from stored reserves within the body. However you must provide a comfortable rest area and the oxygen water fuel requirements for the brain to rebalance the body.

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WILDERNESS NAVIGATION

OBJECTIVE: To develop observation practices, map reading skills, and basic map and compass navigational techniques.

DESIRED UNDERSTANDING:

1. The basic techniques of observation, map reading and finding direction.
2. Sources of trail information.
3. Navigation is dependent upon finding one known direction.
4. Basic map and compass usage.
5. Trail information.
6. The objective of route finding.

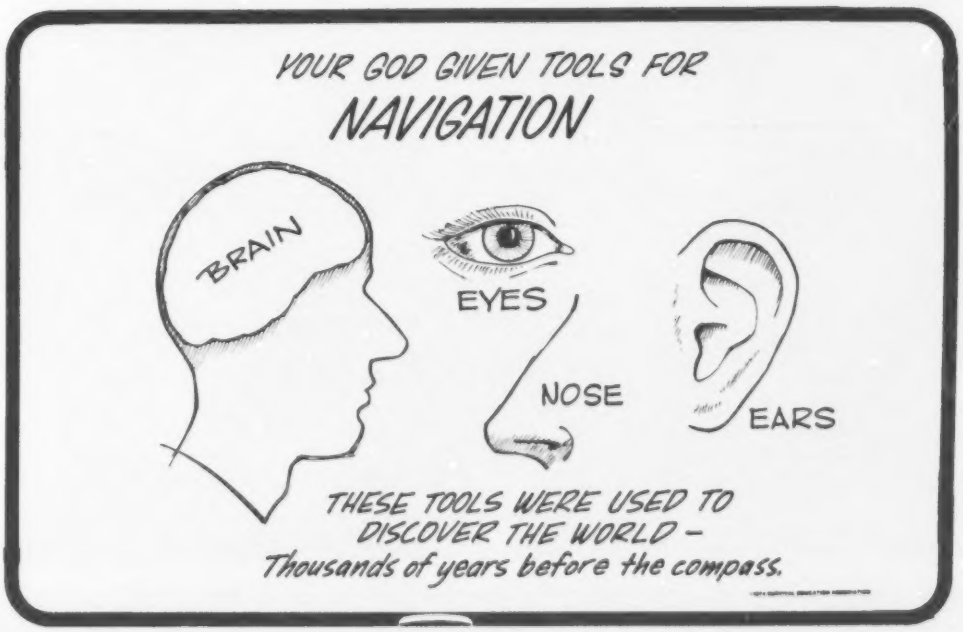
I. ***Observation*** is learning to look for prominent landmarks and remembering them in relation to their surroundings.

A. Observation techniques are used every day: To walk to the corner grocery store, to drive to work, to find a parked car in a large parking lot.

EXERCISE: Describe in as much detail as possible:
Walking or riding a bus to school.
Riding in a car to a nearby city.
Walking through a park or along a wilderness trail.
Specify a beginning point and destination; describe as many landmarks as possible -- streets, buildings, shrubbery, unusual trees, etc.

B. Emphasize the ***backward look.*** Landmarks may not be recognizable on a return trip.

OE-110



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II. Maps are pictorial representations of the land as seen from above. The amount of detail on the map is a function of the scale of the map, i.e., how many inches on the map is equivalent to a mile of actual land or water.

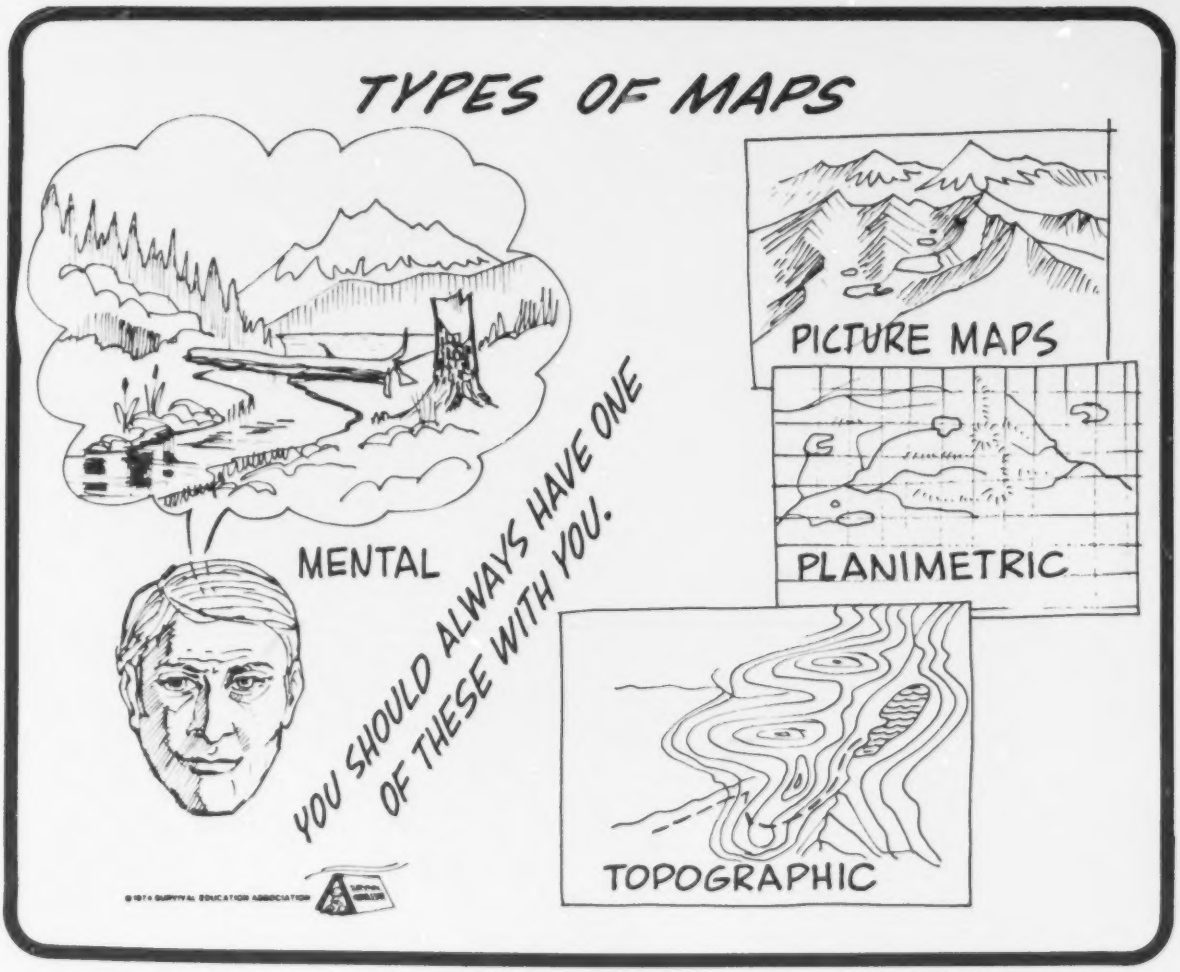
A. ***Map design*** is based on function:

Mental maps are pictures we retain in our minds. Every day navigation in familiar areas is based on mental pictures. A child's radius of navigation increases as his capacity increases for retaining mental images of the surrounding area.

Pictorial maps are pictorial representations of the geography and topography as seen from the air.

Topographic maps are planimetric maps with topography represented by elevation contour lines.

OE 111



Humans have five extraordinary senses that analyze and store information for later use by the analytical brain. These are the tools you use around home and city. If outdoorsmen would slow down and see what is around them their wilderness navigation would be easy. But thousands of outdoorsmen will suffer the misery and discomforts of being lost, confused, or disoriented because they have to ***hurry, hurry,*** *or they do not practice the simple artificial tools for navigation beyond the roadhead.*

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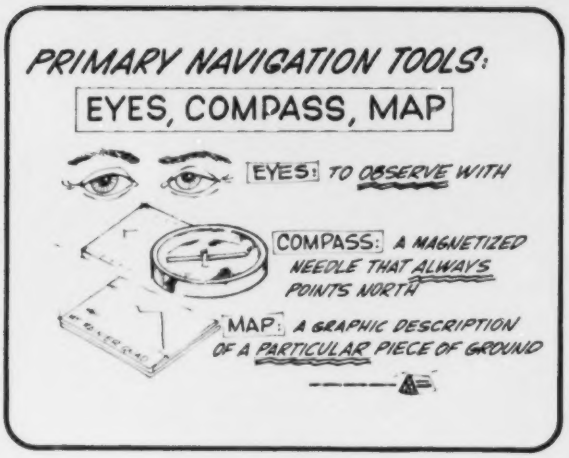
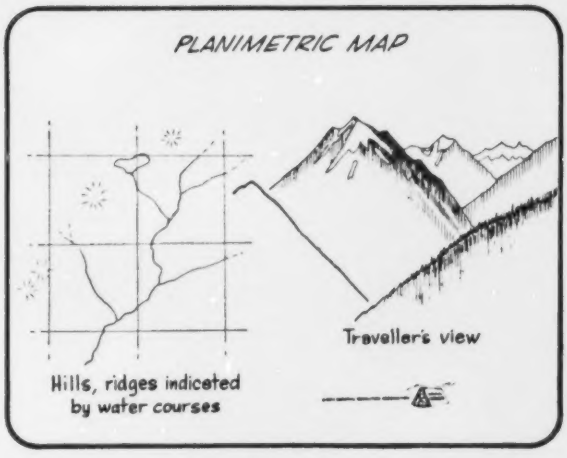
B. ***Sources*** **for maps are:**

U.S. Geologic Survey – Topographic.
U.S. Forest Service – Planimetric.
National Park Service – Planimetric, topographic.
Retail map stores – Planimetric, topographic
See "MAPS" in the Yellow Pages.

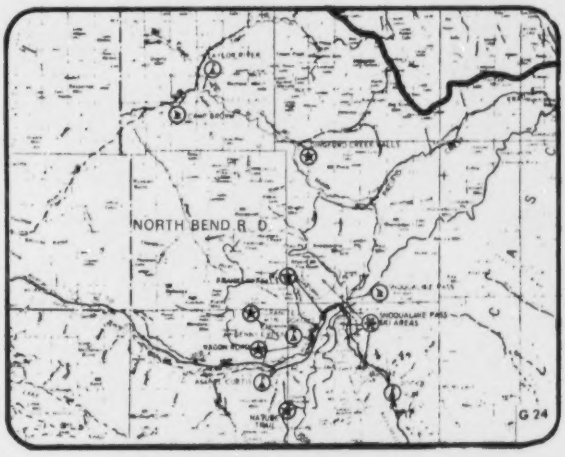

PRIMARY NAVIGATION TOOLS:
EYES, COMPASS, MAP
EYES: TO OBSERVE WITH
COMPASS: A MAGNETIZED NEEDLE THAT ALWAYS POINTS NORTH
MAP: A GRAPHIC DESCRIPTION OF A PARTICULAR PIECE OF GROUND

OE-112

OE-113



OE-114



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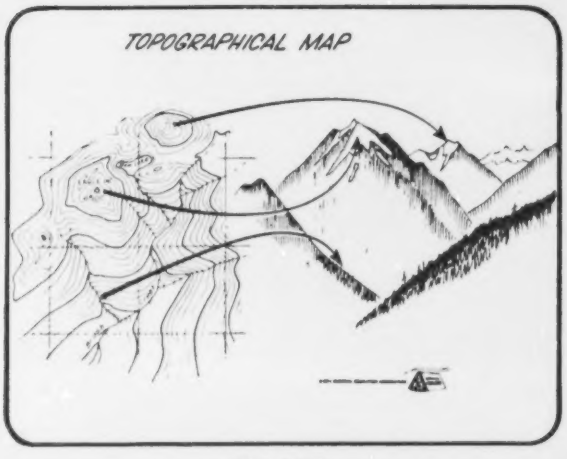
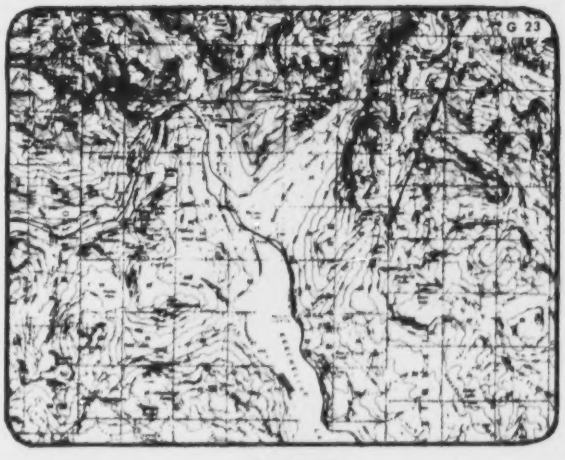


OE-116



OE-117

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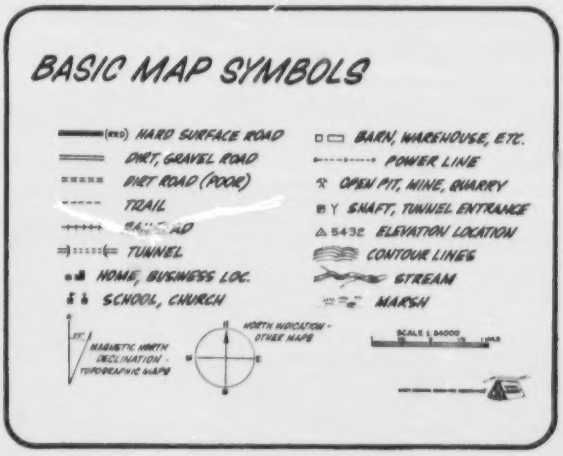
Being lost is not a serious problem, but staying alive long enough to get unlost is! In fact, if you spend enough time in an area it becomes a familiar place. The ancient mariners traveled vast oceans without the artificial tools of map and compass. Indian scouts criss-crossed our nation on foot without using them; but modern outdoorsman travels too fast to use the natural navigational aids.

BEING LOST IS NOT DANGEROUS IN ITSELF...
IN FACT, with the proper mental attitude, it can really be interesting if time isn't critical and you are SELF-SUFFICIENT.
THINK OF BEING LOST as an opportunity to explore a new area.
THE DANGER IS IN LOSING SELF-CONTROL.
DANIEL BOONE said:
"I've never been lost, though I will admit to being confused for several weeks." (!)

OE 118



OE 119

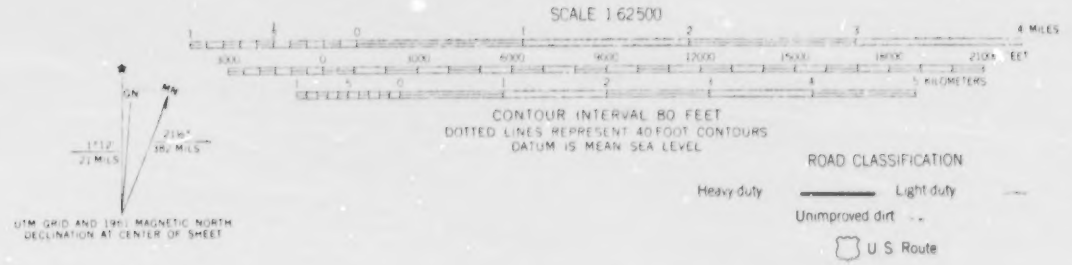
EXERCISE: Repeat the observation exercise in the form of a map. Define the symbols used.

Describe in as much detail as possible:
Walking or riding a bus to school.
Riding in a car to a nearby city.
Walking through a park or along a wilderness trail.
Specify a beginning point and destination; describe as many landmarks as possible -- streets, buildings, shrubbery, unusual trees, etc.

C. Map *symbolism* includes:

The *legend* contains information to identify the map -- title, date, method of mapping, scales.

The *scale* indicates the size of the map relative to the actual topography, i.e., 1:62,500 indicates that 1 inch on the map is equal to 62,500 inches (approximately 1 mile) on the earth's surface.



SAMPLE LEGEND
U.S.G.S. TOPOGRAPHIC MAP

SNOQUALMIE PASS, WASH.
N4715—W12115/15
1961

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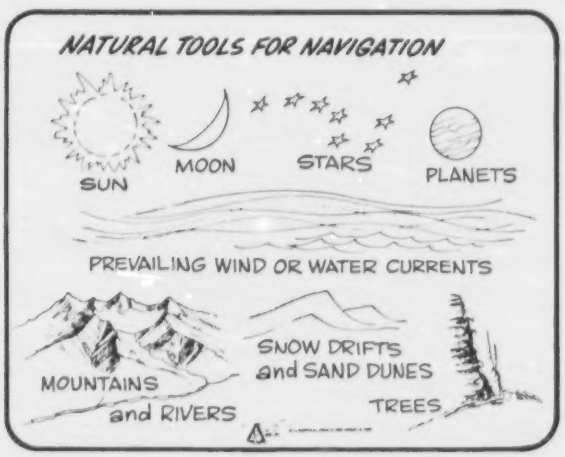
Contour lines are lines of constant elevation. They are a pictorial representation of the topography of the mapped area.

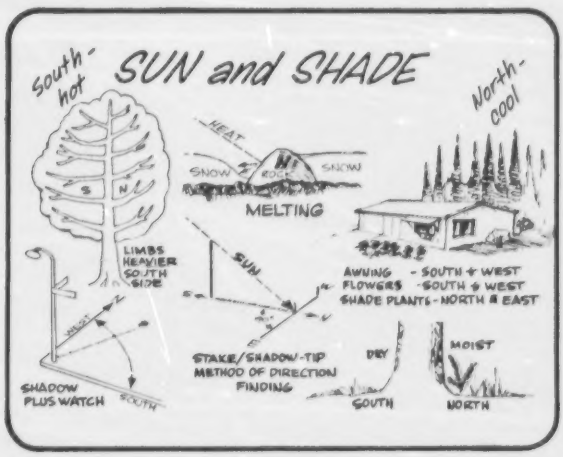
Map symbols vary with the type of map. Some maps identify symbols in the legend. The primary symbols used on U.S.G.S topographic maps are on page 76.

III. *Navigation is dependent upon finding and relating to a given direction, usually north.*

A. Some ***natural signs*** can show direction. Most natural direction-finding tools rely on heat from the sun, celestial movements, prevailing wind and/or water currents, and a knowledge of local topography.



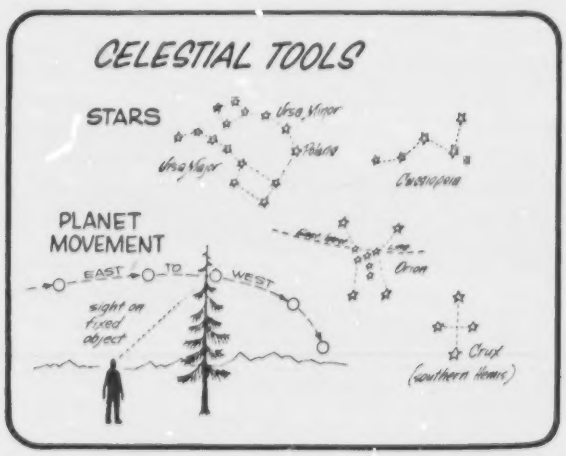
OE-120



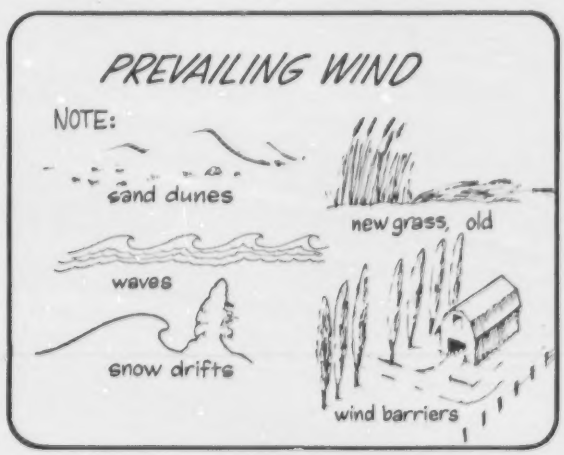
OE-121

The use of natural signs for navigation requires a knowledge of the above phenomena as they relate to the local area. Local topography and climatology can change these signs, for example, the prevailing wind can be shifted by local mountain ranges, water bodies, microclimates.

1. The ***stars*** are reliable direction finders. The most common method is to locate the North Star through the geometry of the Big Dipper **(URSA MAJOR)**



OE-122



OE-123

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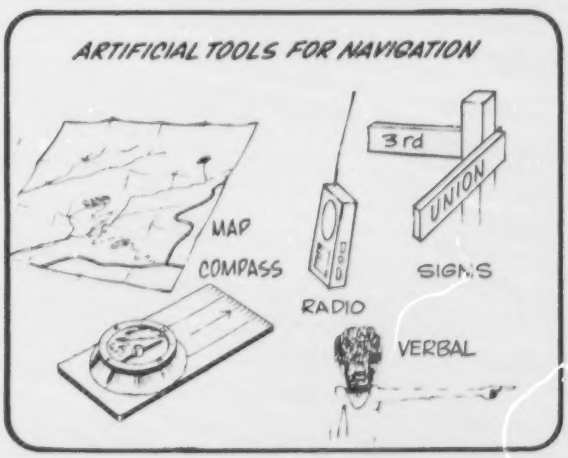
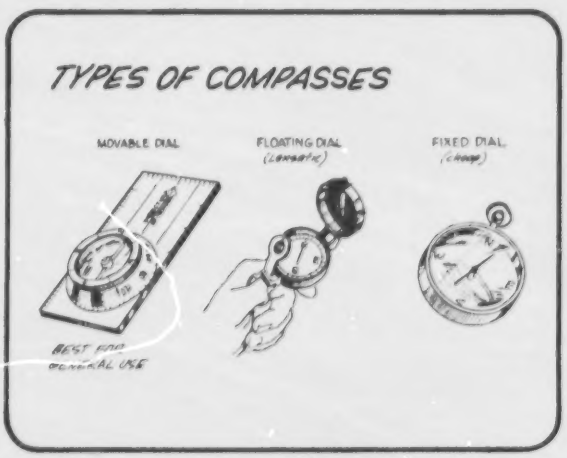
2. Knowing the ***prevailing wind direction***, snow and sand drifts are usually on the lee or downwind side of protruding objects (rocks, trees, knolls). In regions of strong prevailing winds trees may be permanently bent away from the wind. Beware of local deviations caused by gullies, hills and other wind deflectors.
3. Pines, spruces, hemlocks and other softwoods tend to be huskiest on the south side.
4. Ant hills are found on the warm south side of trees and other objects.
5. Vegetation grows larger and more open on north slopes, smaller and denser on southern exposure.
6. Moss will grow on the shady side (usually north) of trees that are exposed to sunlight all day. However, certain lichens closely resembling moss grow best on the sunny side.

B. ***Artificial tools*** for direction-finding are man-made.

1. In our daily activities we rely on ***verbal instructions*** from others, street signs, radio, television, and other man-oriented tools.
2. A ***map*** is man's pictorial representation of the land about him.
3. Directions can be determined from a map once it is oriented to True North, i.e., when it accurately depicts the earth's surface, directionally.
4. A ***compass*** relies on the natural phenomenon of the earth's magnetic force field. Properly used it is the most reliable navigational direction finder.



OE-124



OE-125

The basic ***construction details*** of a compass are:

Liquid-filled to dampen needle motion. This allows for faster, more accurate determination of direction.

A ***rotating dial*** to allow accurate settings.

A rectangular or ***square base*** or other structure to aid in sighting and for proper map alignment.

Optional features:

Map scales imprinted on the base.
Magnifying glass imbedded in the base.
Special sighting devices.

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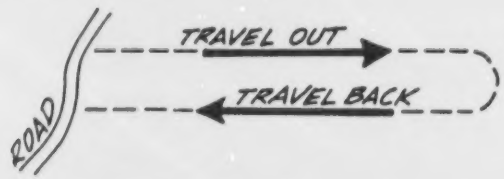
IV. The basic skills required for accurate navigation with a compass and map are:

A. Use of a ***baseline*** to return to original location involves travelling away from the baseline on a bearing and returning on the reciprocal bearing. The baseline may be a road, trail, river, ridge crest, etc.

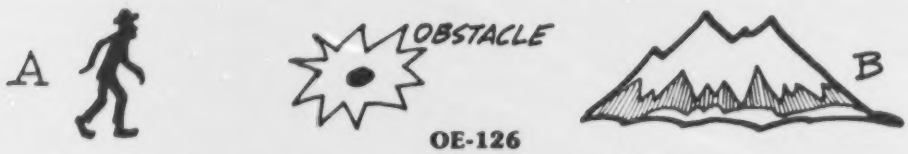


OE-126

B. ***Running a compass line*** involves travelling from point A to point B given a bearing on which to travel.

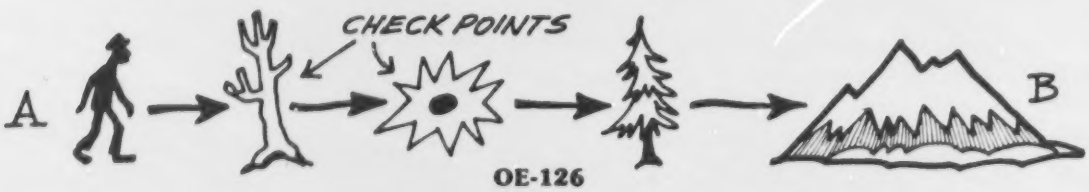
OE-126

1. Align compass with point B, record bearing.
2. If point B will not be visible throughout your travel from point A, then establish prominent landmarks as checkpoints between A and B.



OE-126

3. At each checkpoint sight back on previous checkpoint to double-check direction of travel and to establish visual references for a possible return over the same route.



OE-126

Backsighting is also a check against local magnetic influences, for example, a poor compass reading. Compass needles are affected by local attractions, such as metals, local ore deposits, metal in the user's pockets.

Smart outdoorsmen always pick a north facing landmark or push a stick in the ground when they see the North Star. This helps to orient the camp in relation to the canyon, the mountain, river, and other observable landmarks.

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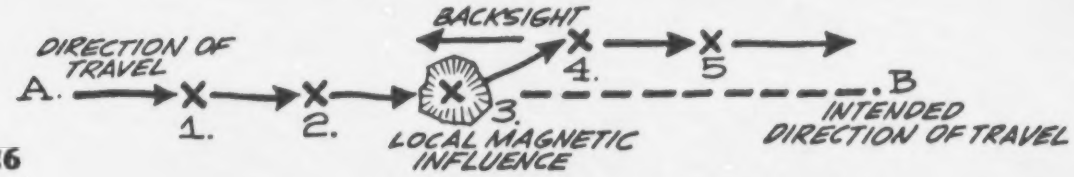
EXAMPLE: On one often-climbed summit in The Cascades the compass needle will vary as much as 30 degrees by moving less than 10 feet, apparently because of ore deposits with the rock.



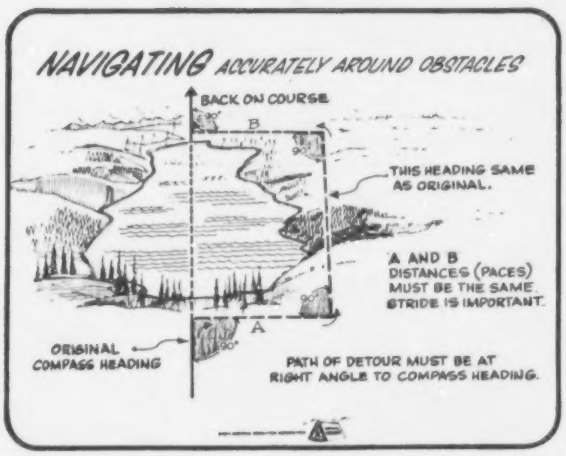
OE 126

In this example the local magnetic influence at checkpoint 3 causes an erroneous compass reading. This same influence is unlikely to occur at checkpoint 4. Thus a backsight from 4 to 3 will indicate an error. Without this backsight check, the overall course has been changed and you will not get to point B.

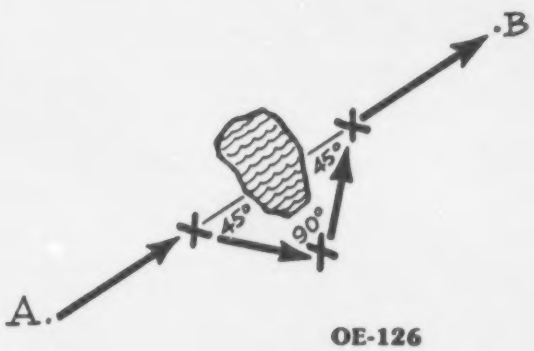
C. ***Avoiding obstacles*** **in running a compass line involves detouring a measured distance and angle, then returning to the original line by one of the methods shown.**

Method 1. Detour at 90° angle until obstacle is cleared, measure distance travelled (number of steps).

Return to original direction of travel until past obstacle. Then return to original line of travel by following reciprocal of bearing on leg 1 and returning the same distance as leg 1. At this point another 90° turn puts you back on the original line and direction of travel.


NAVIGATING ACCURATELY AROUND OBSTACLES
BACK ON COURSE
B
THIS HEADING SAME AS ORIGINAL.
A AND B DISTANCES (PACES) MUST BE THE SAME. STRIDE IS IMPORTANT.
A
ORIGINAL COMPASS HEADING
90°
PATH OF DETOUR MUST BE AT RIGHT ANGLE TO COMPASS HEADING.

OE-127



OE-126

Method 2. Detour at a 45° angle to clear the obstacle.

When abreast of the obstacle return to the original line of travel by turning 90° toward the original path and travelling the same distance as leg 1. A 45° turn at this point puts you back on the original line and direction of travel.

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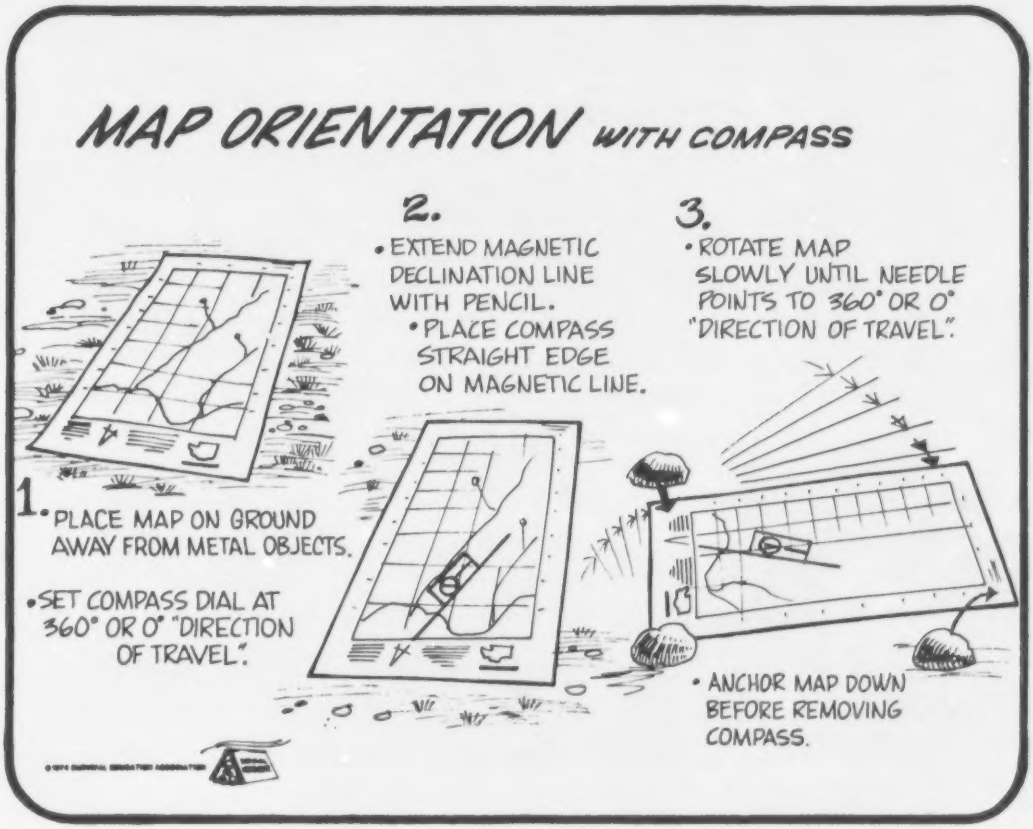
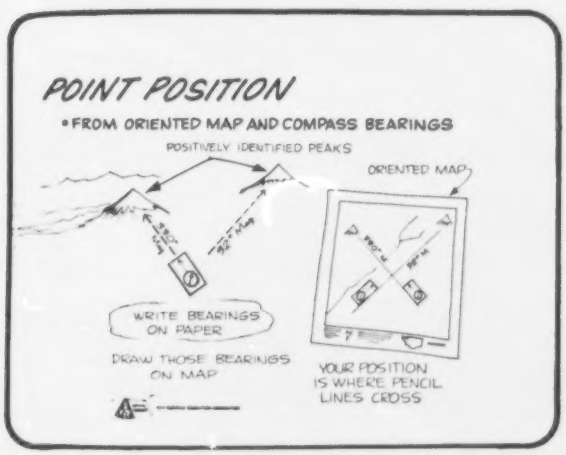
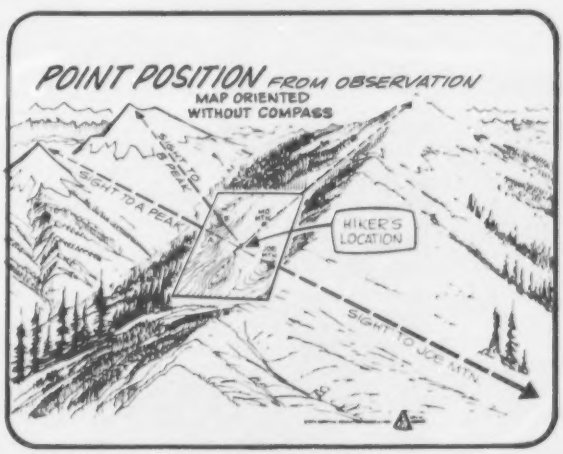
D. ***Map orientation*** **is necessary to align the map with True North. This is essential before the map and compass can be used together for accurate navigation.**


MAP ORIENTATION WITH COMPASS
1. • PLACE MAP ON GROUND AWAY FROM METAL OBJECTS.
• SET COMPASS DIAL AT 360° OR 0° "DIRECTION OF TRAVEL".
2. • EXTEND MAGNETIC DECLINATION LINE WITH PENCIL.
• PLACE COMPASS STRAIGHT EDGE ON MAGNETIC LINE.
3. • ROTATE MAP SLOWLY UNTIL NEEDLE POINTS TO 360° OR 0° "DIRECTION OF TRAVEL".
• ANCHOR MAP DOWN BEFORE REMOVING COMPASS.

OE-128


POINT POSITION
• FROM ORIENTED MAP AND COMPASS BEARINGS
POSITIVELY IDENTIFIED PEAKS
ORIENTED MAP
WRITE BEARINGS ON PAPER
DRAW THOSE BEARINGS ON MAP
YOUR POSITION IS WHERE PENCIL LINES CROSS

OE-129



OE-130

E. ***Map and compass*** **can now be used for more intricate navigation.**

1. **Locating yourself from identifiable landmarks given 2 landmarks that can be accurately identified on the map.**

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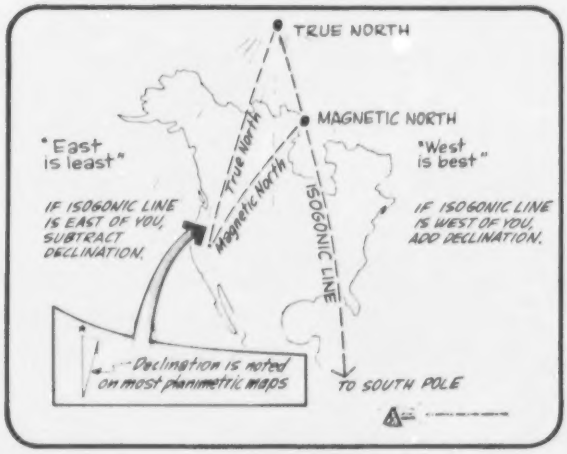
The same principles apply to the use of the map if no compass is available and if 2 or more points on the map can be accurately identified.

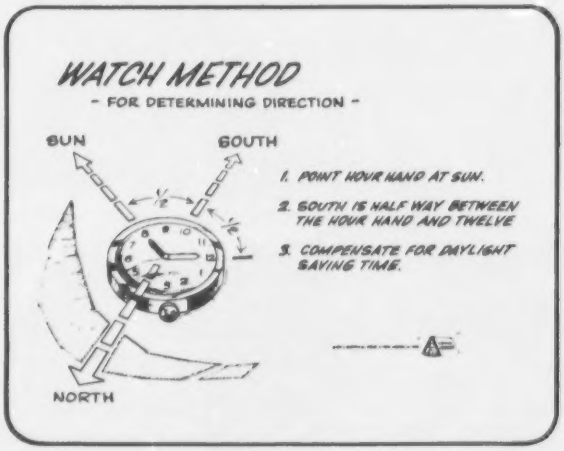
Magnetic declination refers to the difference in the direction a compass points and the direction of True North.

True North is a geographical feature.

Magnetic North is a function of the magnetic field surrounding the earth.


TRUE NORTH
MAGNETIC NORTH
"East is least"
"West is best"
True North
Magnetic North
ISOGONIC LINE
IF ISOGONIC LINE IS EAST OF YOU, SUBTRACT DECLINATION.
IF ISOGONIC LINE IS WEST OF YOU, ADD DECLINATION.
Declination is noted on most planimetric maps
TO SOUTH POLE

OE-131


WATCH METHOD
- FOR DETERMINING DIRECTION -
SUN
SOUTH
1. POINT HOUR HAND AT SUN.
2. SOUTH IS HALF WAY BETWEEN THE HOUR HAND AND TWELVE
3. COMPENSATE FOR DAYLIGHT SAVING TIME.
NORTH

OE-132

V. The following sources give additional detailed trail or route information:

Trail guidebooks contain maps, detailed trail description, including flora and fauna, available water, campsites. The information is usually dated and should be treated accordingly.

Photographs, especially aerial photos, can provide up-to-date information useful for route-finding.

Forest and ***Park Rangers*** should be able to provide meaningful information on proposed routes.

Other individuals who have recently been in an area can provide accurate information. Sometimes this information is in the form of newspaper or magazine articles.

VI ROUTE FINDING FOR ENJOYMENT AND SAFETY

The objective of *route finding* is to travel between two points in the most efficient manner, i.e., with the least expenditure of energy.

A. Valley and gully bottoms are usually filled with dense growth and involve difficult travel.

B. Travel across open snowfields can be treacherous if you do not carry proper equipment and ***know how to use it.*** Conversely, snow can make travelling easier by covering brush, scree and talus slopes, etc.

C. Contouring around a steep hill can be less energy-consuming than going over the top.

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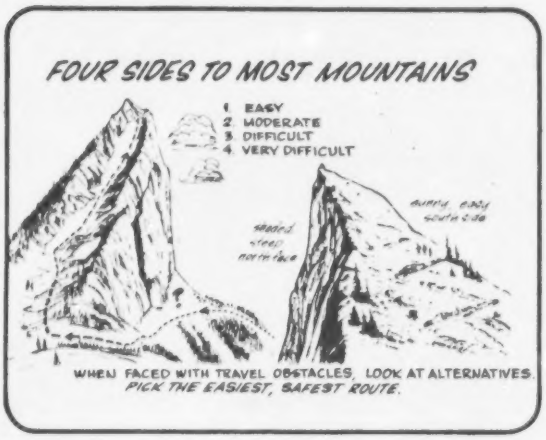
D. Environmental dangers are everywhere in the wild outdoors.
   1. Off trail travelers should adhere to the common sense rules of safe travel.
   2. When faced with steep cliffs take the time to find the easiest and safest route.
   3. Stream crossings require jumping agility, a liking for ice cold glacier water, or luck in finding a suitable log bridge.



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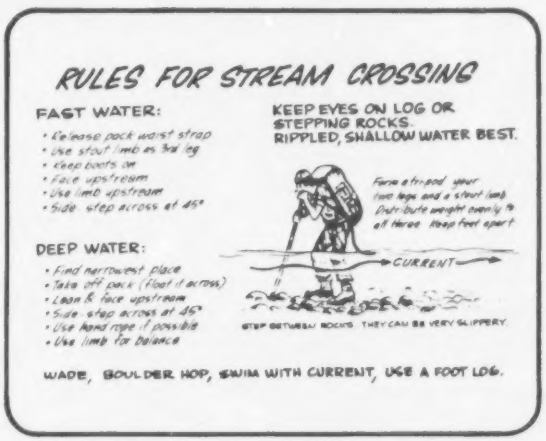
RULES FOR STREAM CROSSING
FAST WATER:
• Release pack waist strap
• Use stout limb as 3rd leg
• Keep boots on
• Face upstream
• Use limb upstream
• Side step across at 45°
DEEP WATER:
• Find narrowest place
• Take off pack (float it across)
• Lean & face upstream
• Side step across at 45°
• Use hand rope if possible
• Use limb for balance
KEEP EYES ON LOG OR STEPPING ROCKS.
RIPPLED, SHALLOW WATER BEST.
CURRENT
WADE, BOULDER HOP, SWIM WITH CURRENT, USE A FOOT LOG.

OE-134

E. Beach travel has unusual environmental problems. Always inquire about the safety and precautions of a beach trip before attempting. Get information about the trip from someone who has traveled that beach.

BEACH TRAVEL CONSIDERATIONS
• CHECK YOUR TIDE TABLE
• SHELTER, CAMP LOCATIONS, FRESH WATER
• ADEQUATE CLOTHING
• CHECK WEATHER FORECAST
• DISTANCE FROM ROAD
• RESERVATIONS & PRIVATE LAND
• SLIDES FROM BEACH CLIFFS
• RIP TIDES, DROP OFFS
• UNUSUAL WAVE ACTION

OE-135

OE-136

F. Downhill travel off the trail is always considered hazardous. Foot placements are hidden. Wet grass, moss, dead leaves and gopher holes are often the step to a fast, uncontrolled descent.

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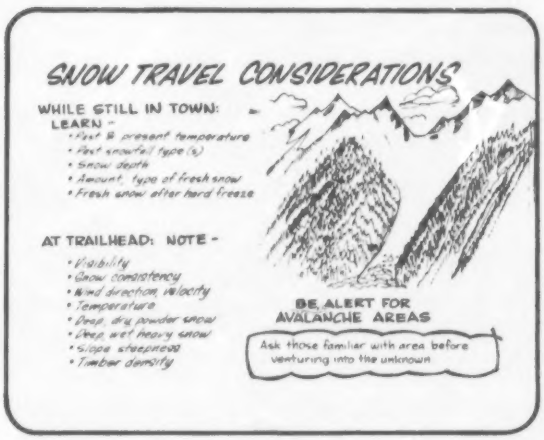
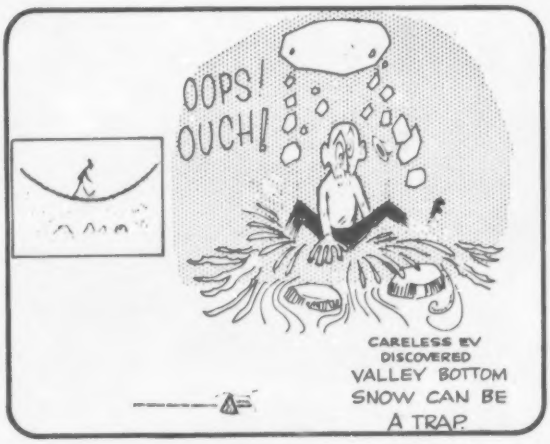
G. Travel on snow during any of the three seasons snow prevails always presents a challenge to an outdoorsman's judgement. Acceptable conditions for travel vary with the experience level, equipment, and the activity. Expect changing weather and snow conditions during fall, winter, or spring travel. Spring thaws often cause unexpected delays, moats, or thin spots in the snow often develop along valley bottom streams. Wherever water and air melt away snow from underneath, thin spots should be expected. Rivers rise quickly, bridges wash away and ice-crusted snow makes travel slow.

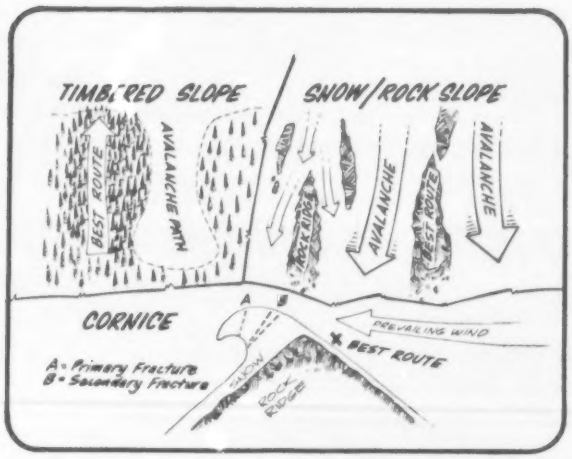

SNOW TRAVEL CONSIDERATIONS
WHILE STILL IN TOWN:
LEARN -
• Past & present temperature
• Past snowfall type(s)
• Snow depth
• Amount, type of fresh snow
• Fresh snow after hard freeze
AT TRAILHEAD: NOTE -
• Visibility
• Snow consistency
• Wind direction, velocity
• Temperature
• Deep, dry powder snow
• Deep, wet heavy snow
• Slope steepness
• Timber density
BE ALERT FOR AVALANCHE AREAS
Ask those familiar with area before venturing into the unknown

OE-137

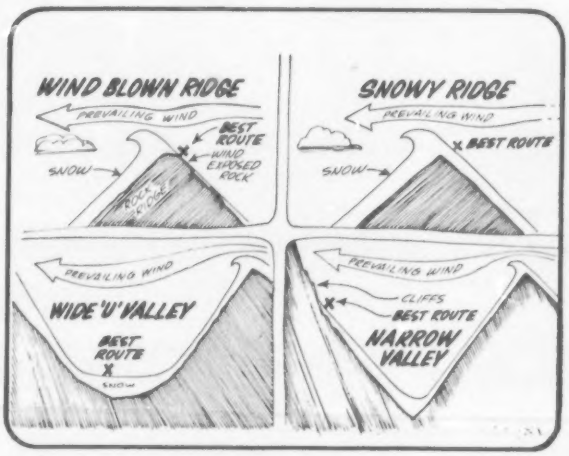


OE-138

H. Whenever snowfall is heavy, suspect avalanche conditions. Under certain conditions all snow in open areas of 30° to 50° can be unstable. Caution is advised. Ask about snow conditions from those who know the land before attempting snow trips. Snow depth, snow consistency, air temperature and snow consolidation factors in unfamiliar areas offer valuable information about the dangers of avalanches.



OE-139



OE-140

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FIELD TRIP #1: INTRODUCTION TO WILDERNESS ENVIRONMENT

One day.

1. Equipment evaluation.
   Review the essentials. Be sure all students are prepared for weather changes, etc.
2. Clothing evaluation.
   Review clothing principles. Critique clothing worn and carried by students.
3. General techniques of trail travel.
   Introduce pace, rest step, trail courtesy.
4. Plant and animal identification.
   Look for animal signs and edible plants.
   Point out potential natural shelters that could be used in an emergency.
6. Basic navigational skills.
   A. Observation.
      At intervals have students describe the return route. Ask them to point the direction of the car or trail head.
   B. Map and compass.
      Introduce basic map and compass skills.
      1. Map reading, identifying landmarks, general orientation.
      2. Locating True North by various methods.
      3. Demonstrate navigation with map and compass.

Preparation.

1. Check for possible medical or physical problems.
2. Be sure students are adequately clothed and carry at least basic body shelter.
3. Lay out ground rules for the outing. Most importantly, stay with the group.
4. Plan the hike within the capabilities of the students and of the leaders.
5. Be sure you carry adequate clothing and equipment to cover any emergency situations.
6. Provide for enough leadership help to adequately cover the number of students involved.

Follow-up.

1. Have students evaluate their own clothing and equipment based on the actual conditions encountered.
2. Have students draw a map of the hike indicating points of interest. Have them describe the hike in as much detail as possible.

FIELD TRIP #2: OVERNIGHT BACKPACK TRIP

Two days.

1 through 6. Same as Field Trip #1.

7. Campsite selection.
   Review selection considerations. Allow students to establish their own campsites within certain boundaries. Approve each location before a camp is actually constructed.
8. Shelter construction.
   Allow the students to set up their own shelter. Critique and modify if necessary. Critique final shelters with all students.
9. Fire building.
   Restrict campfires to one central group fire. If circumstances and regulations allow students can be organized into supervised groups for firebuilding practice. Keep fires small and observe all rules for fire usage.
10. Camp safety.
    Monitor the use of all cutting implements as dictated by the ages of the students. Establish camp rules, especially those pertaining to potential safety hazards, i.e., lakes and streams. Do not allow any person to leave the camp area without your knowledge.
11. Camp cooking.
    This should be mostly a student activity. Interest can be added by providing hot chocolate, popcorn, or other "goodies" around the central campfire in the evening.
12. Sleeping warm.
    Check out each student's sleeping accommodations - shelter, sleeping bag, ground insulation. If you have an evening campfire, have the students exercise and or drink warm liquids before retiring, especially if the night promises to be cold.

Preparation.

1. Same as for Field Trip #1.
2. Check out intended camp area if you are not totally familiar with it:
   A. Adequate number of campsites.
   B. Hazards – water, cliffs, etc.
   C. Water availability and purity.
   D. Sanitation facilities.
   E. Fire regulations.
3. Students should practice erecting the shelter they plan to use before this trip.
4. If fires will not be used, students must be equipped to cook (stoves, fuel).

Follow-up.

1. Have students evaluate their performance individually and as a group.
2. Present hypothetical "what if . . ." problems to the students based on actual experiences during the overnight camp.

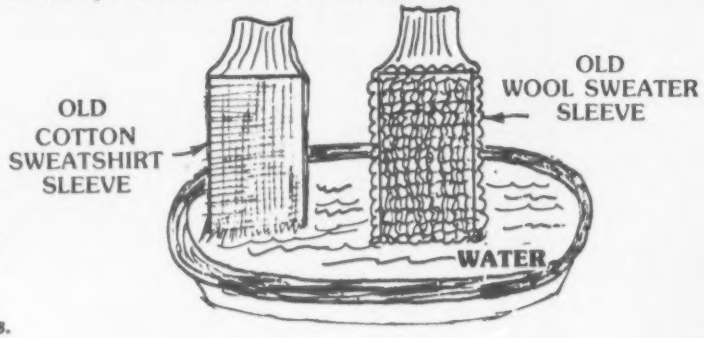
RECOMMENDED FIRST AID SUPPLIES *by Dick Mitchell*

Item	*Quantity and Size*	*Use*
Accident Form and Pencil	Two	To ensure accurate information is communicated to rescue assistance.
Aspirin	Twelve tablets - 5 grain	1 to 2 every 4 hours, for pain.
Antacid	Six tablets	For indigestion or heartburn; may be Bucladin, Ulcetral, Rollaids, etc.
Antihistamine	Six tablets	1 every 4 hours for insect bites, colds or hives; may be Contact, Coryban D, etc.
Band-aids	Twelve one inch	For minor cuts.
Butterfly Band-aids (or know how to make them)	Six (various sizes)	For closing lacerations.
Carlisle Battle Dressing or equivalent bulk absorbent	One 4"x7"	For large bleeding wounds it is absolutely essential that clean absorbent dressings be applied completely over the wound with sufficient pressure to stop bleeding.
Molefoam	1/2 pkg.	For padding blisters.
Needle	One medium size	To remove splinters, puncturing blisters, etc.
Tincture of Benzoin	1 oz. bottle	To hold tape in place and protect the skin.
Antibacterial soap or Tincture of Zepherin	1 oz. bottle (plastic)	Mild antiseptic for abrasions, cuts.
Razor blade or small scissors		For cutting tape, molefoam, hair, loose bandage ends, etc.
Roller Gauze	Two rolls 2"x5 yds.	For holding gauze flats in place.
Safety pins	Three (1 large)	Mending seatless pants.
Salt tablets	Twenty-four	To prevent exhaustion and cramps due to heavy perspiring.
Steri-pad gauze flats	Six 4"x4"	For large abrasions.
Tape, non-waterproof	2" roll	For sprains, securing dressings, etc.
Triangular Bandage	One	For supporting arm and protecting dressing from contamination.
Optional Items:		
First Aid and Rescue Instructions		To ensure treatment is complete and correct.
Wire splint	One	For splinting suspected forearm, wrist or ankle fractures.
Thermometer (Oral Rectal Combination)	One	For determining temperature of victim, or water when treating frostbite.
Tweezers	One pair	For removing splinters.
Prescription Medicines		For pain, sleep, insect bites, etc. To be used only by the person for which it was prescribed. If carried, each should be stored in its original container, clearly labelled as to dosage, purchase date, type of drug and expected reaction.

Put in airtight, waterproof container - seal with plastic tape - metal container preferred.

EXPERIMENT: Insulating Quality of Wool Vs. Cotton

Obtain an old cotton sweatshirt and wool sweater. Cut a sleeve off of each. Wet the sleeves, slip one over each hand, and hold them up in the wind. Evaluate the warmth of each.

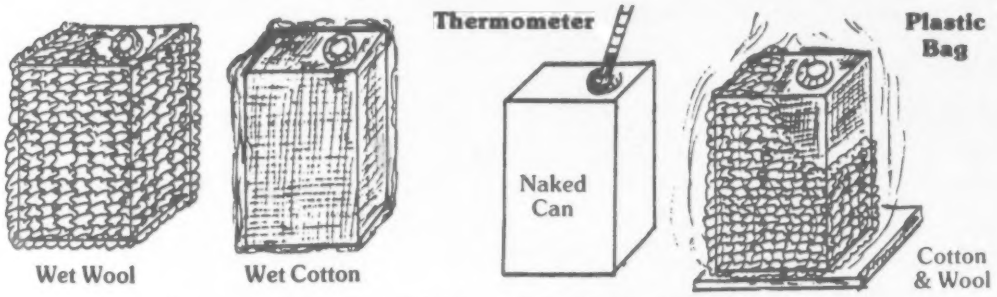


EXPERIMENT: Water Can Demonstration.

To demonstrate: Heat loss.
Fabric comparisons.
Wind and Water effects.

Equipment required: Four 2-gallon metal cans.
Thermometer.
Enough wool material to cover 2 cans.
Enough cotton material to cover 2 cans.
Plastic bag big enough to hold 1 can.
1 piece of foam rubber or styrofoam big enough to form a base for 1 can.

SHALLOW PAN
1/2" WATER



Put all 4 cans through a sprinkler-simulated rainstorm

SET-UP:
1) *Fill 4 cans with hot water, note temperature.*
2) *Wet 1 piece of wool, 1 cotton. Cover 1 can with each.*
3) *Cover 1 can with successive layer of cotton, wool, plastic. Set on insulation.*
4) *Leave 1 can "naked."*
5) *Place all cans in shaded, windy spot outdoors.*

Record:
1) *Initial water temperature.*
2) *Outside air temperature.*
3) *Water temperature in each can at 1-hour intervals.*

Compare: Different combinations of wet vs. dry
wool vs. cotton
naked vs. protected

Conclusions: Heat loss is greater when wet and or windy.
Wool slows heat loss more than cotton.

Radiation, convection and conduction remove the heat rapidly and simulate their effect on the human body under similar conditions.

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APPENDIX I

HEAT TRANSFER AND THERMAL CONDUCTIVITY

By Jim Mitchell

HEAT TRANSFER

1. Heat will flow from a system (body) to another system (body) with which it is in contact and which is at a lower temperature.

OR

Heat is energy that flows from one body to another because of a temperature difference between them.

2. Heat is transferred by:

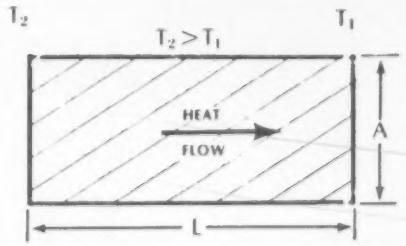
A. Conduction — The transfer of energy (heat) arising from the temperature difference between adjacent parts of a substance. Energy is transferred directly between adjacent molecular aggregates without mass motion of the materials.

B. Convection — Transfer of heat in liquids or gases accomplished by the motion of the fluid from a locality where it receives heat to a locality where it gives up heat.

C. Radiation — The energy radiated per unit area per unit time from a substance is approximately proportional to the fourth power of the absolute temperature; i.e., $\frac{Q}{t}\frac{1}{A} = (°C + 273)^4$.

3. Fundamental Laws of Heat Conduction

$$\frac{dQ}{dt} = -KA\frac{dT}{dx} \text{ which reduces to } \frac{Q}{t} = \frac{-KA(T_2 - T_1)}{L}$$



$\frac{Q}{t}$ = Heat flow per unit time

T_2 = Higher temperature

T_1 = Lower temperature

A = Cross-sectional area of substance

L = Length of substance

K = Thermal conductivity

This equation basically says that the rate of convection heat flow is a function of the thermal characteristics of the substance, the length and cross-sectional area, and the difference in temperature between 2 points.

4. Thermal Conductivity is a measure of a substance's ability to conduct heat. A higher value indicates the substance is a better conductor; a lower value indicates a better insulator.

TABLE OF THERMAL CONDUCTIVITY

Air	5.7×10^{-6}		1.0	Air
Wood	2×10^{-5}		3.5	Wood
Glass	2×10^{-4}		7.0	Glass
Ice	4×10^{-4}	Reducing this table	7.0	Ice
Lead	8.3×10^{-3}	to air as the base	145	Lead
Steel	1.1×10^{-2}	produces these	1930	Steel
Aluminum	4.9×10^{-2}	relative values	8600	Aluminum
Silver	9.9×10^{-2}		17400	Silver

Table 6-1 RELATIVE THERMAL CONDUCTIVITY

Courtesy of Jim Mitchell, President, Northwest Mountain Guides, Inc.

The above can be interpreted as follows:

1) Wood is approximately 1/3 as efficient as **still** air as an **insulator.**

2) Steel **conducts** heat 1900 times as fast as still air.

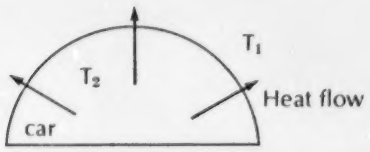
To compare the above directly, we have to assume the same dimensions and temperature differences. An interesting comparison can be made making use of the equation in a realistic physical situation:

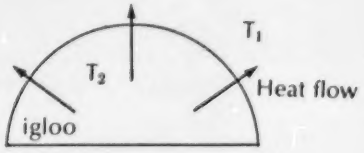
1) Given a car (steel) and an igloo (still air assumed in walls)

2) Given same initial inside and outside temperatures.

3) Neglect convection losses through igloo walls.

4) Assume same cross-sectional area for car and igloo. Assume hemisphere for both, then A = total surface area of hemisphere since the heat will flow through the wall. Therefore, L = thickness of the wall.





$$\frac{Q}{t} = -9.9 \times 10^{-2} \frac{A(T_2 - T_1)}{L}$$

$$\frac{Q}{t} = 5.7 \times 10^{-6} \frac{A(T_2 - T_1)}{L}$$

Comparing $A(T_2 - T_1)_{car} = A(T_2 - T_1)_{igloo}$ Then $\left[\left(\frac{Q}{t}\right) \frac{L}{5.7 \times 10^{-6}}\right]_{car} = \left[\left(\frac{Q}{t}\right) \frac{L}{9.9 \times 10^{-2}}\right]_{igloo}$

This reduces to $\left(\frac{Q}{t}\right)_{car} = \frac{9.9 \times 10^{-2}}{5.7 \times 10^{-6}} \frac{L\ igloo}{L\ car} \left(\frac{Q}{t}\right)_{igloo} = 1930 \frac{L\ igloo}{L\ car} \left(\frac{Q}{t}\right)_{igloo}$

So if the wall thicknesses were the same, the car would conduct heat away 1930 times faster than the igloo. However, to be realistic, the car thickness is approximately .15" while the igloo wall thickness might be 6". Now we have a heat flow rate for the car of $\frac{1930(6)}{.15}$ or 77200 times that of the igloo. Interesting?!?

In general, 2 substances of the same shape and size but different thicknesses can be compared by:

$$\left(\frac{Q}{t}\right)_1 = \frac{K_1}{K_2} \frac{L_2}{L_1} \left(\frac{Q}{t}\right)_2$$

The above example does not take into account insulation in the car and assumes no air movement through the igloo walls but I think it is reasonably realistic.

SAMPLE MENUS

OVERNIGHTER: FOR 3

LUNCH
Sack lunch from home

DINNER (evening) (3 persons)

Vegetable soup ..... 1 package
Macaroni and Cheese ..... 1 box Krafts
Tea ..... 1/4 oz. (6 tsp.) (makes 6 cups)
Instant coconut pudding .. 1 box (dry milk added at home)

Note: Cook fruit for breakfast.

BREAKFAST (second day)

Stewed apricots ..... 5 oz. (dried)
Coffee ..... 1/2 oz. (6 tsp.) (makes 6 cups)
Pancakes ..... 10 oz. pancake flour (add water type)
Syrup ..... 6 oz. brown sugar
Bacon ..... 12 oz. fresh (store) bacon

LUNCH

Cup 'O Soup of your choice ..... 3 envelopes
Cheese ..... 3 oz. (Gouda good keeper)
Rye Krisp or French Bread
Peanuts or other nuts ..... 3 oz.
Dried Fruit (of the type that can be eaten uncooked .. 5 oz.
Tea or Tang

Note: These foods may be obtained from your local supermarket.

THREE DAY TRIP FOR THREE:

(Keep food weight light if it's to be carried)

LUNCH (First day)
Sack lunch from home

DINNER (evening) First day

Tea ..... 1/4 oz. (makes 6 cups)
Vegetable soup ..... 2-1/2 oz. (dehyd.)
Chicken and noodles ..... 5 oz. noodles
2-1/2 oz. noodle soup (dehyd.)
7 oz. can chicken

Note: Cook fruit for breakfast

BREAKFAST (Second day)

Coffee ..... 1/2 oz. (makes 6 cups)
Stewed fruit ..... 2 oz. vacuum packed
Oatmeal ..... 3 pkgs. instant
Eggs ..... 3 oz. (dehyd.)
1-1/2 oz. Bacon bar mixed with eggs

Note: Pream or Milkman pd. milk
Twin Sugar or Saccharin tablets

LUNCH (Second day)

Lemonade ..... 1 oz. (lemon powder) (Wylers)
Beef soup ..... 3 pkgs. Cup O' Soup
Sweet potatoes ..... 3-1/4 oz. (dehyd. instant)
Summer sausage ..... 3 oz.
Candy (other than chocolate) ..... 3 oz.

DINNER (Second day)

Tea ..... 1/4 oz.
Tomato soup ..... 2 oz. (dehyd.)
Freeze dried meat patties ..... 3 or 4
Instant potatoes ..... 4 oz.
Mushroom gravy ..... 1 pkg.
Hot chocolate before bed ..... 3 pkgs. milk pd. added

Note: Cook fruit for breakfast

BREAKFAST (Third day)

Coffee
Applesauce ..... 2 oz. (dehyd.)
Oatmeal ..... 3 pkgs.
Eggs ..... 3 oz. (dehyd.)
1-1/2 oz. Bacon Bar added to eggs

LUNCH (Third day)

Summer sausage ..... 3 oz.
Cheese ..... 3 oz. Gouda
Rye Krisp or Pilot Bread ..... 2 oz.
Vanilla ice cream ..... 1 package (freeze dried)
Tang

All foods listed may be subsituted or changed as desired.
The objective is enjoyment, within weight limitations.

CHECK LISTS AND CONSIDERATIONS FOR OUTDOOR ACTIVITIES

GOING HIKING OR CLIMBING

Equipment

- ☐ Comfortable boots
- ☐ Suitable clothing for the season and weather expected
- ☐ Hat & Gloves
- ☐ Sunglasses
- ☐ Rucksack or pack To carry your Life Support and comfort supplies
- ☐ Area map & compass
- ☐ Plastic tube tent
- ☐ Canteen of water
- ☐ First-aid kit
- ☐ Survival kit
- ☐ Knife
- ☐ Flashlight
- ☐ Emergency food
- ☐ Light nylon rope
- ☐ Matches & fire starter
- ☐ Leaf bag
- ☐ IN AUTO: A complete change of dry clothing, food and water

Considerations

- ☐ Tell someone where you are going and when you plan to return
- ☐ Reasonable objective
- ☐ Never go alone
- ☐ Permits & regulations
- ☐ Body protection Energy refueling
- ☐ Water re-supply
- ☐ Physical stress involved
- ☐ Companions' limitations
- ☐ Weather in the area
- ☐ Terrain steepness
- ☐ River crossings
- ☐ Proper maps
- ☐ Weather protection
- ☐ Distance from help
- ☐ Other personal medications
- ☐ Other personal needs
- ☐ Spare prescription eye glasses

DANGERS: **Injury in a remote area, avalanches, rock fall, swift water crossings, unreasonable objective, getting lost, unexpected weather, wet clothing, fatigue, hypothermia, hypohydration, hyperthermia, heat or cold extremes, darkness, frustrating companions.**

TIPS: **Stay together - stay comfortable - be alert for weather changes, be aware of terrain dangers and escape routes. Watch your companions for attitude changes.**

✪ WHAT EVERY OUTDOORSMAN SHOULD HAVE ✪

IN HIS OR HER POCKET

- ☐ A GOOD KNIFE
- ☐ BUTANE LIGHTER or matches
- ☐ Compass or knowledge of navigation
- ☐ LEAF BAG – 7 bushel size
- ☐ HARD CANDY or energy resupply

By Gene Fear, 1977
Survival Education Assn.
Tacoma, Wash.

IN HIS OR HER STOREHOUSE OF KNOWLEDGE

- Mental map of where you are and where you have been
- Awareness of seasonal weather problems and weather extremes
- Alertness for possible shelters and escape routes
- Ability to conserve energy and coolant
- Ability to maintain comfort and body protection

GOING BICYCLING?

Equipment

- ☐ Reliable bike
- ☐ Repair tools
- ☐ Night lights
- ☐ First aid kit
- ☐ Sunglasses
- ☐ Energy resupply
- ☐ Canteen of water
- ☐ Plastic leaf bag

Considerations

- ☐ Tell someone where and when
- ☐ Licenses & regulations
- ☐ Road conditions
- ☐ Weather in the area
- ☐ Physical stress of the trip
- ☐ Body protection
- ☐ Lack of bathrooms
- ☐ Travel terrain & steepness

DANGERS: **Railroad track, grates or road edge crossing, brake failure, other fast moving vehicles, overextending, overloading, wet leaves, loose gravel, curves and steep hills, wind blast, head winds and weather change, dehydration on hot days.**

GOING BOATING ON OWN BOAT?

Equipment

- ☐ Safe reliable boat
- ☐ Life preservers
- ☐ Repair tools
- ☐ Signal devices
- ☐ Anchor and extra line
- ☐ Compass and charts
- ☐ Spare oars
- ☐ Night lights
- ☐ Spare throw line
- ☐ Storm protection
- ☐ Survival kit
- ☐ Sunglasses
- ☐ Water supply
- ☐ Flashlight
- ☐ Plastic leaf bags

Considerations

- ☐ Tell someone where and when
- ☐ Weather and tides
- ☐ Emergency techniques
- ☐ Special body protection
- ☐ License and regulations
- ☐ Physical stress involved
- ☐ Lack of bathrooms
- ☐ Wind and waves conditions
- ☐ Permits
- ☐ Distance from land
- ☐ Energy resupply
- ☐ Expected weather
- ☐ Special shoes (non-skid)

DANGERS: **Unexpected weather change, submerged logs or deadheads, heavy seas or large waves or wakes, fog, squalls, darkness, tide change, fire, explosions during refueling, head winds and rough water.**

TIPS TO A PASSENGER: **Look for your life preserver, throw lines, spare oars and extra body protective coverings, keep your coat handy.**

GOING SNOWSHOEING OR CROSS-COUNTRY SKIING

Equipment

- ☐ Reliable snowshoes or skis
- ☐ Ski poles
- ☐ Comfortable boots
- ☐ Warm wool clothing
- ☐ Hat and gloves
- ☐ Sunglasses
- ☐ Canteen of water
- ☐ Energy foods
- ☐ Map and compass
- ☐ Repair kit
- ☐ Plastic leaf bag
- ☐ Survival Kit
- ☐ Rucksack to carry needed items

Considerations

- ☐ Tell someone where and when
- ☐ Never go alone
- ☐ Weather in the area
- ☐ Snow conditions
- ☐ Avalanche conditions
- ☐ Emergency responses for the area
- ☐ Expected weather
- ☐ Physical stress of the trip
- ☐ Extra body protection
- ☐ Energy resupply
- ☐ Transportation & parking
- ☐ Possible delays
- ☐ Permit or regulations

DANGERS: **Ice crusted snow, heavy wet snow, deep powder snow, poor visibility, broken snow equipment, unrealistic objective, avalanches, fatigue, steep slopes, unexpected weather change, darkness and injuries.**

TIPS: **Stay together, minimum of three in the party, stay comfortable, refuel and rewater often, turn back to car with plenty of reserve energy.**

GOING SKIN DIVING OR SCUBA DIVING?

Equipment

- ☐ Snorkel & face mask
- ☐ Air tanks & weights
- ☐ Full wet suit
- ☐ Fins and knife
- ☐ Regulator
- ☐ Buoyancy compensator
- ☐ Reserve guage
- ☐ Depth guage
- ☐ Compass
- ☐ Watch

Considerations

- ☐ Gain proper instruction before attempting
- ☐ Tell someone where and when
- ☐ Know the current and tides
- ☐ Never go alone
- ☐ Safety lines and flags
- ☐ Water conditions
- ☐ Other traffic in the area
- ☐ In water dangers
- ☐ Qualified support persons in the party for rescue

DANGERS: **Too rapid ascent to surface. Miscalculate depth and time lapse, euphoria, sunken obstructions, poisonous sea life, sharks, bends, and equipment malfunctions.**

TIPS: **Never swim alone. Always use reliable equipment, check your own equipment, test dive before a deep dive.**

GOING STREAM FISHING?
(Lakes fishing - see Boating)

Equipment

- ☐ Pole and fish lines
- ☐ Bait and lures
- ☐ Net and creel
- ☐ Plastic leaf bags
- ☐ Mini first-aid kit
- ☐ Body protection
- ☐ IN AUTO:
  A complete change of warm clothing, food, water, and repair tools for auto and fishing gear

Considerations

- ☐ Tell someone where and when
- ☐ Weather in area
- ☐ Transportation & parking
- ☐ Distance from transportation
- ☐ Body protection
- ☐ Foot gear for slippery rocks
- ☐ Weather up stream from you
- ☐ Energy refueling
- ☐ Map of the area
- ☐ Land and stream bank conditions

DANGERS: **Illegal area, weather upstream causing rising water or flash floods, fish not biting, accidental dunking, hook in flesh, cold wet hands, wet clothing, and wet matches.**

TIP: **Plan to stay comfortable, check footing before stepping, refuel often, know water rescue techniques (self rescue techniques).**

GOING SKIING IN A MANAGED AREA

Equipment

- ☐ Reliable snow skis
- ☐ Safety bindings
- ☐ Safety runaway straps
- ☐ Comfortable clothing
- ☐ Comfortable ski boots
- ☐ Ski poles
- ☐ Sun glasses
- ☐ Hat and gloves
- ☐ Sun cream
- ☐ IN AUTO – a complete change of warm dry clothing, food & water, ski repair kit.

Considerations

- ☐ Your performance level
- ☐ Your partners' ability
- ☐ Weather in the area
- ☐ Snow conditions
- ☐ Body protection
- ☐ Road and travel conditions
- ☐ Energy refueling
- ☐ Water needs
- ☐ Distance from home
- ☐ Regroup often

DANGERS: **Ice crusted snow, heavy wet snow, stormy weather, visibility, loss of control, fatigue, steep slopes, wetness, wind chill, sunburn.**

TIPS: **Warm up on lesser slopes, do not get fatigued, refuel often and be alert for frostbite and hypothermia. Stop skiing when tired or cold.**

SURVIVING THE UNEXPECTED STORM

The first few hours of any wilderness survival emergency will be the most important. Decisions made during this period usually determine life or death. *ONLY YOU CAN ACT TO SOLVE THAT PROBLEM*

WEATHER STORM ENEMIES

RAIN – Cold and wetness cause extreme body heat loss.

WIND – Cools the body; blows away heat faster than the body can produce it.

BLIZZARD – Cold, heat loss, mobility threatened, mental stress.

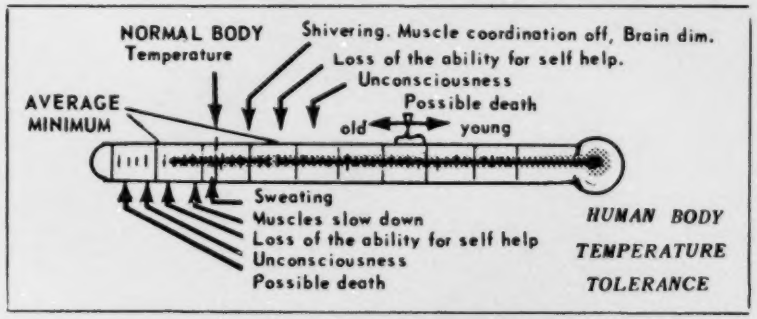
SUN – Body heat gain, dehydration, blindness, burns.

FOG or DARKNESS – Loss of direction, mobility; heat loss, mental stress, fears, etc.

MAJOR BODY ENEMIES (in order of importance)

Take care of the brain first. Then it will take care of you.

#1	– YOURSELF	The mind controls the body, self-confidence, attitude, fears, determination, imagination, ability, skills, panic.
#2	– INJURY	Can affect the priorities of life, mobility, skills, dexterity – compounding the problem of acquiring the necessities of life.
#3	– TEMPERATURE CHANGE	The human body has a very narrow temperature tolerance – 95° F to 101° F. Any change in temperature will affect the normal production of the life energies in the cells.



COMPILED IN THE INTEREST OF SURVIVAL EDUCATION BY GENE FEAR

SURVIVAL EDUCATION ASSN., TACOMA, WASH. 98445

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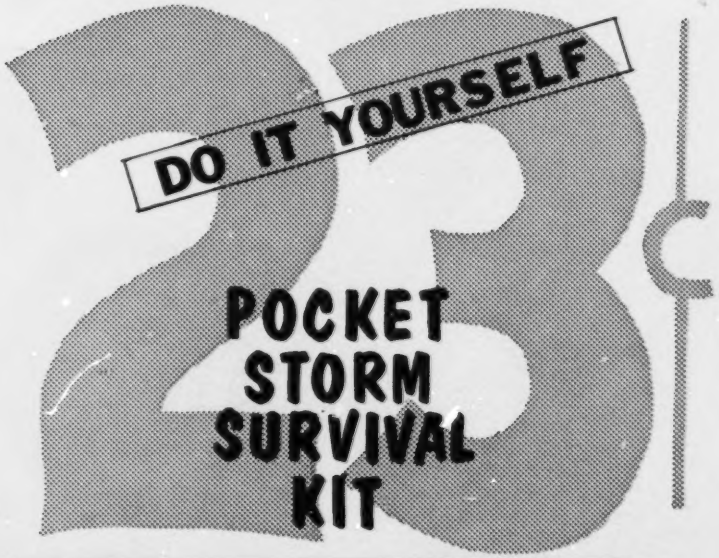
This KIT + Knowledge = Best Overnite Survival Insurance Policy.



This kit is designed to help you acquire the necessities of life during a storm, by providing the following *necessities to help you stay alive.*

INSTANT INTERNAL WARMTH: ☆

Can (for cooking pot, teakettle), Candle, Matches (for fire starting) – treatment for accidental body heat loss. Inner body must be at or near optimum temperature of 98.6° F for living cells to produce the energies to sustain life.

INSTANT BODY PROTECTION: ☆

Plastic tube, bags, or sheet – help retain the vital tropical air layer around the body by keeping you dry, and lessening the transfer of warm air with cold air. Conserves your limited energy supply.

INSTANT ENERGY ☆

Sugar – is what the muscles use to produce heat to keep the body at the nearly constant 98.6° F. You will have a given amount of energy at the time of your emergency. It can be conserved to last a long time, or it can be used up very quickly. The choice is yours alone.

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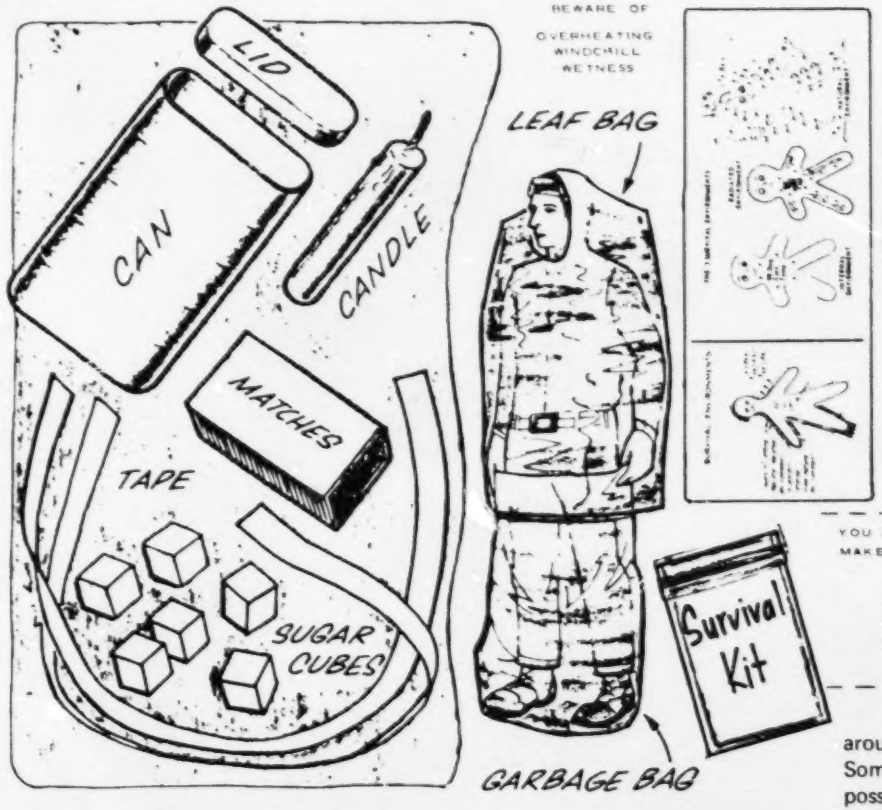
Such a kit, homemade or purchased, cannot help you survive a storm unless it is available when needed. Always carry it whenever you travel away from civilization.



PERSONAL SURVIVAL KIT

Overnight emergency provisions you can fabricate in a few minutes at home from kitchen and garage supplies.

CAN	1 pint liquid can with top cut out is best (clean it well). Lid can be made from plastic and sealed with several wraps of electrical tape. (Any can will do.)
CANDLE	Half of a Christmas candle or plumbers candle will help kindle a fire or heat ¼ cans of water. Put in plastic bag.
MATCHES	Penny box of strike-anywhere matches -- used to light the candle or fire. (Waterproof in a plastic bag.)
LEAF BAG	7-bushel size fits a 6' man. Cut a hole in the sealed end for face or head. Cover head if possible (not the face).
GARBAGE BAG	30-gal. size. Pull up over legs and tuck into pockets to protect legs from wind and rain. These bags can be used for shade from the sun.
SUGAR CUBES	6 to 12 cubes will give instant energy needed to move muscles for heat production. Wrap in plastic.
TAPE	May be used to close face opening, patch clothing, secure top and bottom plastic, as emergency bandage tape, etc.

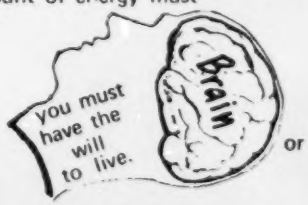
YOU HAVE ADMITTED YOU MIGHT NEED THIS KIT SOMEDAY BY TAKING THE TIME TO MAKE IT. MAYBE YOU WOULD LIKE TO MAKE IT BETTER. SOME SUGGESTIONS:

1 SINGLE-EDGE RAZOR BLADE	NYLON FISH LINE (50') AND HOOKS
2-3 BANDAIDS	SMALL WHISTLE
2-3 TEA BAGS	SMALL MIRROR
2-3 BOUILLON CUBES	24" SMALL WIRE - 18 GAUGE
2 DIMES - FOR THE PHONES	2 SALT PACKETS

THINK!! YOUR BRAIN IS YOUR BEST SURVIVAL TOOL!!

In any unexpected storm you will have a given amount of energy, which will take you so far, so fast. This limited amount of energy must provide the fuels to:

Mentally solve the problem of staying alive,
Move muscles to provide vital body heat,
Move muscles for your mobility, and dexterity,
Control the mind -- which controls all mental and physical use of this limited fuel.



The threat to life during any unexpected emergency will be centered around certain body enemies that attack the body in a variety of ways. Sometimes singly, sometimes in concert -- but always these enemies will possess a threat to the process of sustaining life without assistance or guidance from others. You must know how these can harm you and how to prevent them from getting too great a hold upon the body.

For you to solve the problem of staying alive --

You must recognize a challenge or a threat against your life.
You must react to the body's problem indicators.
You must ascertain the priorities needed to maintain life.
You must combat the body's enemies that threaten life.

These demands must be met regardless of the cost in material things or energy expenditure.

It's your body -- and your problem.

Recommended Books

Backpacking - One Step At A Time, Manning, Rec. Coop. Seattle.
Mountaineering - Freedom of the Hills, The Mountaineers, Seattle.
Boy Scout Handbook - Boy Scouts of America.
How to Stay Alive in the Woods - Bradford Angier.
New Way of the Wilderness - Calvin Rutstrum.
The Book of Survival, Anthony Greenbank, Wolfe Pub. London.
The Survival Book -Pond, Allen, Funk Wagnalls
Food in the Wilderness - G.W. Martin and R.W. Scott.
Surviving the Unexpected Curriculum Guide - Survival Education Association.
Wilderness Emergency - Fear, Survival Education Association.
Mountaineering First Aid - Dick Mitchell, The Mountaineers.
The Wilderness Handbook - Paul, Petzoldt, Random House.
The Outdoorsman's Handbook - Accerrano, Winchester Press.
The Complete Walker - Fletcher, Random House.
Basic River Canoeing - McNair, A.C.A.
Pleasure Packing - Robert Woods, Candor Books.
All About Camping - Merrill, Stackpole
Winter Hiking - John Danielsen
Complete Snow Camper's Guide - Bridge Scribners
The Best About Backpacking - Sierra Club
Free Wheeling - Bicycle Camping, R. Bridge, Stackpole.

Recommended Films

The Thermal Wilderness (Effect of heat) - SAFECO Insurance Co.
By Nature's Rules (Effect of cold). - SAFECO Insurance Co.
Lost Hunter (Psychological effect). Film Original, Boise, Idaho.
Survival Stress (Psychological effect). A.F. - TF 1-5375. Air Force.
Survival - Mountain and Desert (General). A.F. - TF-5571A., Air Force.
Mountains Don't Care (Mountain). Mountain Rescue Association.
Castles in the Snow (Winter). - Life Support Technology.
Snow How (Winter - mechanical). - Life Support Technology.
Out of the Sea (Beach). Life Support Technology.
Edible Plants of Field and Forest - Local film libraries.
Survival Films and Slides - National Rifle Association.
The Survival of Barney - Allen Films, Covina, Ca.,
Campfire Control - Jim Lawless, Seattle, Wa.

VISUAL AIDS FOR TEACHING ANY OUTDOOR SPORT

140 colored graphics of this book's illustrations are available from the publisher

Survival Education Association has over 500 colored graphics to teach staying alive during life's emergencies. Teaching Guides and Survival Education Texts, covering all aspects of survival from natural, man-made or wilderness survial.

Write for complete illustrated catalog - $1.00.

Slide Cost 1977 - $105.00 per complete set.
Metal storage case - $15.00
Slide replacements - .80¢ each.

Cost subject to change without notice.

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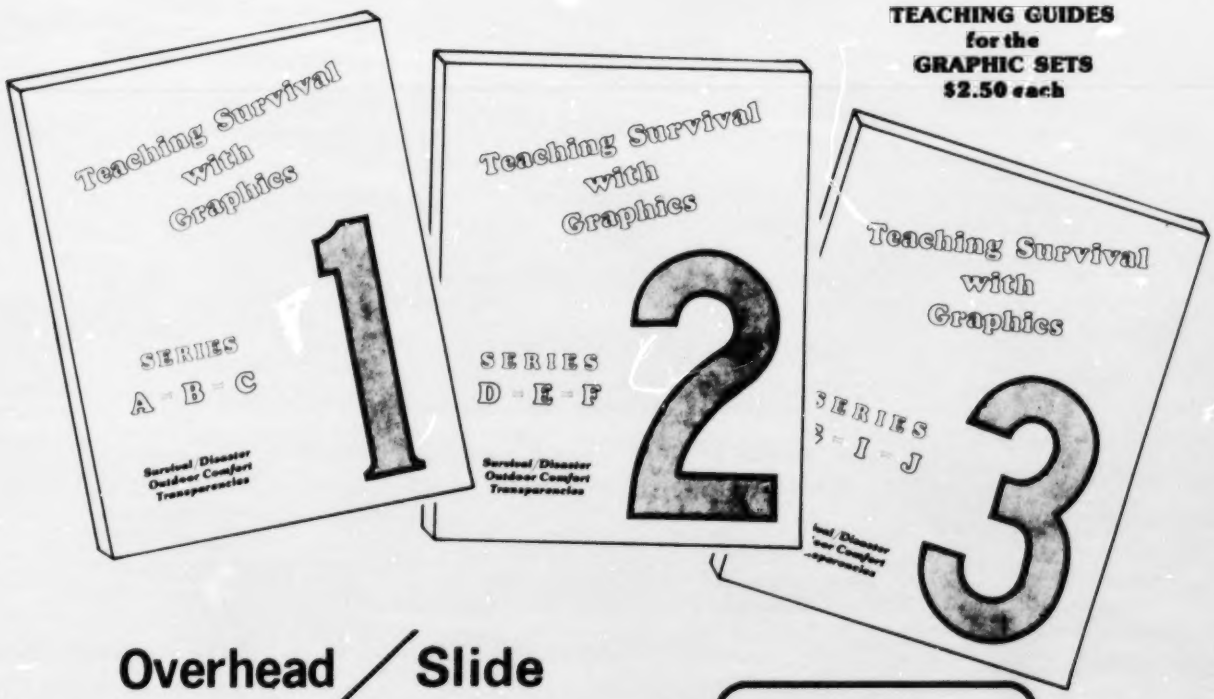
for the
GRAPHIC SETS
$2.50 each



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TEACHING SERIES
25 Graphics per set

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- **D. Your Limited Resources**
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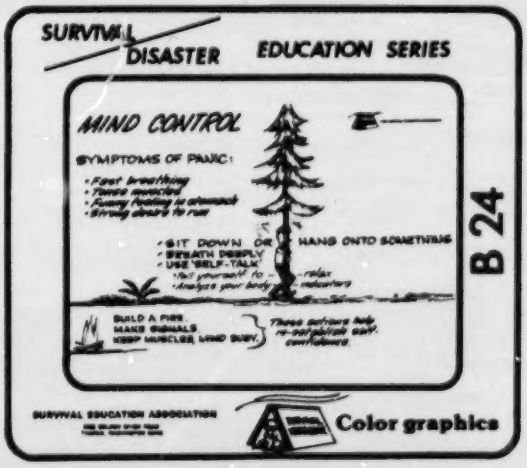
Illustrated preview catalog of all graphics $1.00



SURVIVAL EDUCATION ASSN. has many other lesson plans and graphics for teaching courses in total emergency preparedness for coping with everyday emergencies and natural disaster response.

SUPPORTIVE GRAPHICS FOR TEACHING SURVIVAL DISASTER EDUCATION

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DON'T FOOL WITH MOTHER NATURE * SHE DOES NOT ACCEPT EXCUSES *

Your Enjoyment or Misery

is related to your forethought and preparedness to maintain body comfort in changeable outdoor environments